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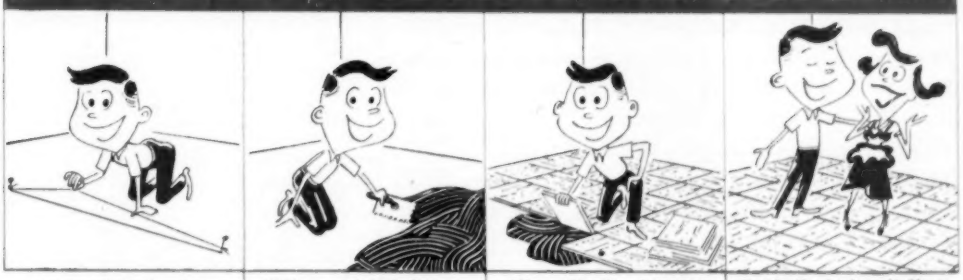

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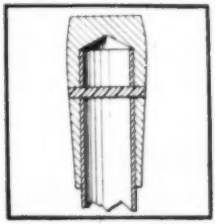

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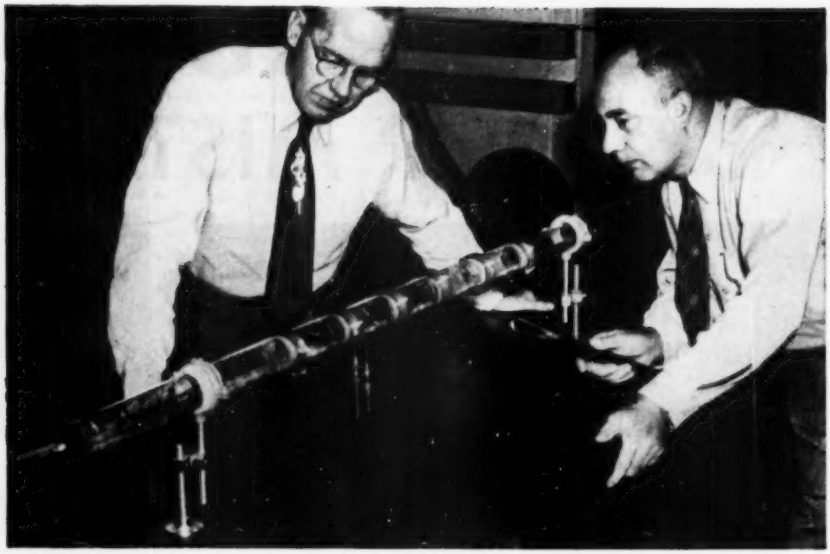

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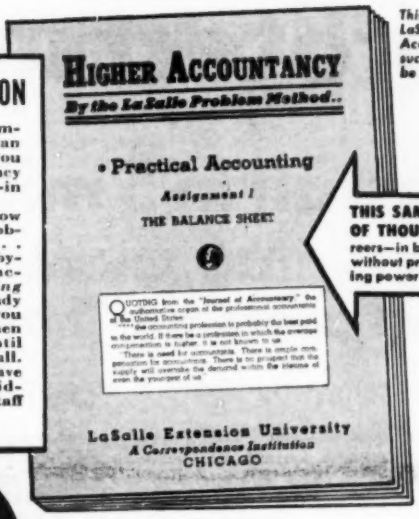

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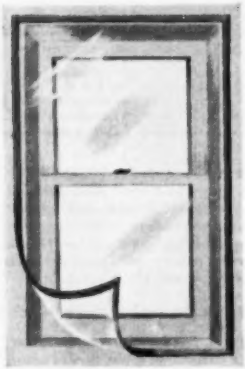

LIFT ADHESO BORDER FOR AIRING

install in 5 minutes

SAVE $100 OR MORE!

just press on *That's All!*

• no nails • no hooks • no screws • no tools

Imagine a storm window that weighs less than 8 ounces — yet seals out wintry blasts and humidity like magic! Flexible like rubber! You can punch it, kick it, even tap it with a hammer and it springs back — never shatters! This amazing new type storm window is as TRANSPARENT as CLEAR GLASS! Not affected by snow, sleet, rain, dampness, because it is 100% WATER-PROOF. Resists climate changes — won't crack even at 25 degrees BELOW zero! Will pass any and all Fire Department tests! To install just press it on with dual purpose Adheso border — no nails, no screws, hooks, or tools! Costs you only pennies, yet you can use and re-use it year after year for winter protection and comfort! Try one at our risk and you'll never use old-fashioned storm windows again!

low-cost health protection

WINTER COMFORT! You can hardly see this TRANS-KLEER storm window—it's wonderfully transparent, but it protects you and your loved ones from winter's cold blasts and humidity. Saves dollars, too, in fuel bills! It's your cheapest health insurance! And only 39½c each!

OVER ONE MILLION SOLD LAST YEAR!

Over 1,000,000 of these new type windows sold last winter alone. We invite you to try one, too, entirely at OUR RISK—no obligation whatsoever for you! When you have tried one, when you see how easily and quickly it goes on, when you've TESTED it, you'll never again use the heavy, bulky, old-fashioned kind! No more back-breaking installation! No more broken glass to contend with! No more storing problems—at winter's end just fold away like CLOTH for the following season—year after year! Enjoy the ease and convenience of this new, safe, sure way to winter comfort—for only pennies per window! TRANS-KLEER comes in rolls 36 inches by 432 inches—ENOUGH FOR 10 AVERAGE SIZE WINDOWS, at ONLY 3.95—HARDLY 39½c EACH! Of course, smaller windows use less TRANS-KLEER material, while larger ones use more. In all, you receive 108 SQUARE FEET! Yes! 108 SQUARE FEET for only 3.95! Why pay MUCH MORE elsewhere? You cut TRANS-KLEER with scissors to any size required—then press on with

WINDOW family all winter!

the Adheso border—and presto! The job is done! You can lift it any time for airing the room—then re-seal in 1 second flat! How practical! How convenient! And how low in cost! No wonder so many have been sold! No wonder so many home owners, hospitals, government buildings and churches are switching to this new winter protection! We disappointed lots of folks last year because the supply ran out. To avoid disappointment, rush your order NOW—while our supply lasts! More cold weather is on the way right now! SEND NO MONEY. Simply fill in coupon and mail at once. Pay postman only 3.95 plus a few cents postage on delivery of each roll. Try a window at OUR risk for 5 days. Test it any way you like. If not delighted, KEEP THE WINDOW and get your 3.95 back—no questions asked! You have nothing to lose—LOTS to gain in winter comfort and health protection! ACT NOW!

THORESEN'S, Dept. 7-L-47
352 FOURTH AVE. NEW YORK 10

prove it yourself with this simple match test!

On a windy day, hold a lighted match just inside a CLOSED window. The first stiff, strong gust of wind will blow it out. NOW put up your TRANS-KLEER sheeting as instructed . . . you'll find out that a lit match held just inside the window will NOT blow out EVEN IF YOU KEEP YOUR REGULAR WINDOW OPEN!

5 WAYS BETTER

1 REAL GLASS-LIKE TRANSPARENCY! Never milky or cloudy.

2 LOW CONDUCTIVITY — A modern REYNOLON development.

3 WATERPROOF & FIRE RETARDANT — conforms with all Fire Department ordinances.

4 RESISTS CLIMATE CHANGES — never cracks even at 25 below zero!

5 RE-USABLE YEAR AFTER YEAR — takes little storage space!

mail coupon now →

THORESEN'S, Dept. 7-L-47
352 Fourth Avenue, New York 10, N. Y.

RUSH . . . . . rolls TRANS-KLEER at 3.95 each, enough for 10 windows or 108 square feet. I will pay 3.95 plus postage on arrival. This is on a trial basis. I will try one FREE. If not delighted, I will return the 9 remaining windows for refund of 3.95—no questions asked. Include Adheso Borders at no extra cost.

NAME .....

ADDRESS .....

TOWN ..... ZONE ..... STATE .....

. . . .SAVE POSTAGE by sending only 3.95 with this coupon. In that case, we pay ALL POSTAGE to your door. Same money-back guarantee.

(CANADIANS. Send orders direct to our Montreal plant. Add $1 (total $4.95)—same guarantee; no extra for tariff. THORESEN CO., Dept. 7-L-47, 45 St. James St., West, Montreal 1, P.Q.)

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Your Big Opportunity!

34-lesson course on proved, tested, up-to-date **profitable** methods. Amazing treasure-house of the best mail order plans and practices. How to start your mail order business on a small one-man scale . . . how to keep it growing more and more profitable month after month. Money-making facts. Full price only **$6.95**. Satisfaction guaranteed or refund. Circle below **No. 40** for Mail Order Course.

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No previous Art training necessary. These excellent lessons guide you step-by-step. You train yourself for a fine career in Art by following these logical, easy-to-understand instructions. More than 700 illustrations included! Lessons cover industrial design, fashion drawing, painting, lettering, typography, packaging, photography, etc. Entirely PRACTICAL and commercial throughout. Satisfaction or refund guaranteed. Full price, only **$9.95**. Order "Art School Self-Taught." **No. 1** in coupon at bottom of page. Rush order today.

How to Run a RESTAURANT...

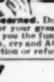
Get into a Good MONEY-MAKING BUSINESS of Your Own!

Virtually a complete self-instruction course on starting and operating profitable luncheonettes, cafeterias, diners, tea rooms, etc. Teaches you the all-important facts about leases, licenses, equipment, furnishings, decorating, kitchen arrangement, menu-planning, etc. How to make money!

FULL PRICE, Only $4.95, Postpaid

This could be your BIG chance! Satisfaction guaranteed or money back. Order "How to Run a Restaurant." **No. 2** in coupon below.

PUBLIC SPEAKING FOR SUCCESS



HOW TO HANDLE PEOPLE

Oratory and public speaking is an art which **must be learned**. Don't you believe bunk about "natural born" **speakers**! For your greater personal advancement let this excellent course **teach** you the fundamentals of influencing people: how to **make them laugh**, cry and ACT. Only **$3.95**. Circle **No. 3** in coupon below. Satisfaction or refund.

5 ACRES *and* INDEPENDENCE

How to Buy a Small Farm and Run It PROFITABLY!

SECURITY is yours when you own a few acres and use them wisely. You supply your own food requirements and possibly enough extra to enjoy a comfortable cash income. Teaches you practical things you want to know about livestock, farming, poultry, orchards, etc. Only **$3.95**. Order "Farming". **No. 4** in coupon.

WATCH and CLOCK REPAIRING

Learn at home spare time. How-to-do-it lessons for beginners as well as those already in the trade. Thorough self-instruction training in the fundamentals of American and Swiss timepieces. Contains a wealth of helpful photos, drawings, diagrams, charts, etc. Only **$5.95** for everything! Order "Watch & Clock Repairing." **No. 5** in coupon. Satisfaction or refund guaranteed.

LOCKSMITHING & Key Making

PRACTICAL UP-TO-DATE COURSE! Only $4.95 complete

Teaches you the **professional** "secrets." How to pick locks, de-code, make masterkeys, install and service key systems, etc. Step-by-step detailed, illustrated instructions make every operation crystal clear. Money-making information for carpenters, mechanics, hardware dealers, gunsmiths, cycle shops, maintenance men, etc. 53 lessons! Satisfaction guaranteed or your money back. Order "Locksmithing Course." **No. 6** in coupon. Only **$4.95**. Mail coupon today!

PIANO TUNING

Experienced piano tuners charge up to $10.00 for a job they finish in about an hour. Repeat business, too! You can start training for this profitable field **right now**. It is NOT necessary that you play piano . . . you don't even have to understand music at all.

SELF-INSTRUCTION COURSE — only $4.95 complete price. This excellent home-study course includes instructions on piano regulating, repairing—other servicing operations every good piano tuner knows. Also covers electric organs, tuning by Stroboscope, etc. Good, clear, helpful illustrations to guide you step-by-step. Money-Back Guarantee. Order "Piano Tuning Course" today. Only **$4.95**. **No. 7** in coupon.

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A new to-the-point Technical Bulletin to teach you how to make money dealing in precious metals—broken jewelry, old gold, silver, platinum, etc. Enormous opportunities for those with experience. Only **$1.00**. Order "Old Gold." **No. 20** in coupon below.

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YOU are a sleeping giant . . . learn how to release your unused forces. Teaches you self-mastery, influencing others, getting ahead, etc. Written by 34 renowned psychologists. COMPLETE. ONLY **$6.95**. Low price! Order "Mental Science." **No. 19** in coupon.

HOW TO GET A GOOD JOB

Shows you step-by-step the successful techniques of upgrading yourself into a better position in any field. Teaches you how to SELL yourself to a new employer for the highest price. A Practical 36-Lesson Course. Full price only **$6.95**. Satisfaction or refund guaranteed. Just circle **No. 43** in coupon below for this 36 lesson course.

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Start by doing work on your own furniture to save money & beautify your home. Then branch out as you gain experience. You'll learn quickly and enjoy these step-by-step illustrated lessons. Easy-to-follow instructions on how to create, repair and remodel practically all kinds of upholstered furniture. You get everything for only **$5.95**, complete. Satisfaction or money back. Order "Upholstering". **No. 9** in coupon.

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A practical plan for retiring young and fully enjoying life . . . while you still have plenty of health and vigor. Tells you how to adjust yourself and make a little money go a long way with comfort. Only **$2.95**. Order "Retirement." **No. 12** in coupon.

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Interesting, simplified self-instruction lessons for builders, mechanics, electricians, etc. 24 volumes, including over 600 actual blueprints, diagrams and step-by-step drawings. FULL PRICE ONLY **$7.95**. Unusual bargain! Satisfaction or refund guaranteed. Order "Blueprint Reading Course" today. Circle **No. 16** in coupon below.

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Be a practical handyman! Save time and money using these professional TRICKS-OF-THE-TRADE. Carpentry now made easy. New self-instruction course in one handy volume, complete with full-page photographs, etc. Teaches practical woodworking, painting & decorating, upholstering, power tools, cabinet making, etc., etc. COMPLETE PRICE ONLY **$2.49**. Order "Build it Yourself." **No. 17** below.

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Professional information for the liquor trade and man-about-town. Details on mixing and serving 300 most popular drinks. PRACTICAL instruction for working behind the bar. How to handle and use spirits, wines, beers. **Trade secrets** on the care of bottles, glassware, mirrors, utensils. How to make syrups, bottle in bulk, prepare fruit. Excellent illustrations. Also includes appropriate toasts for good fellows. Only **$1.95**. Order "Bartender" **No. 32**.

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Wonderful field for ambitious men and women, especially those over 40. Experienced managers have steady work, good pay and SECURITY. Satisfaction or money back guaranteed. Complete, only **$6.95**. Course **No. 8** in coupon below.

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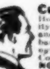

How to develop a strong, positive personality—get rid of timidity, bashfulness, shyness and fear. Successful self-instruction lessons based on new principles of practical psychology. Healthy self-confidence can be yours! Complete course of 22 home-study lessons. **NOT a book.** Full price only **$6.95**, postpaid, or COD plus postage. Mailed in plain **wrapper**. Satisfaction guaranteed or refund. Order "Curing Self-Consciousness Course" today. Circle **No. 41** in coupon at bottom of **page**.

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Yogism aids your self-confidence, will power, self-control. Helps your personal efficiency. Points out time-tested methods for a happier, more **successful** life . . . based on modern scientific discoveries plus ancient Yoga Secrets for releasing your deeper powers. Practical, valuable for everyday use by busy, level-headed Americans. **Send No Money.** Pay postman $4.95 plus COD, or send **$4.95** for postpaid shipment. Satisfaction or refund guaranteed. Send for this "Practical Yoga Course"! **No. 22** in coupon.

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New, well-illustrated, step-by-step series of lessons on how to rebuild shoes. Written for the beginner who wants to go into business or the family man who wants to save money by doing his own shoe repairing. Full price, only **$4.95**. Satisfaction guaranteed. Order "Shoe Repairing Course." Circle **No. 44** in the coupon below.

How to Write Songs—

A PRACTICAL COURSE IN LYRICS—MUSIC—SELLING

Best selling hit songs often are written by those who know only the special "techniques" or **secrets**. You don't have to spend long dreary years studying theoretical music in order to do popular songs the public goes wild over. If you have the stuff inside of you to begin with . . . this **practical** course will teach you how to get it down on paper and will teach you exactly how and where to offer it for sale. ONLY **$3.95**. Satisfaction or refund guaranteed. Order "Song Writing." **No. 26** in coupon.

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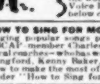
EUGENE FEUCHTINGER'S HINTS ON VOICE DEVELOPMENT



Basic exercises designed to *strengthen* your vocal organs and *improve* your voice. These new self-instructions include the most important parts from the world-famed voice course put out by the Prefect Voice Institute. Full Price, only **$2.95**. In coupon below circle **No. 28**. Order "Voice Development."

HOW TO SING FOR MONEY—Teaches you the art and business of singing popular songs professionally. **Practical** course written by ASCAP member Charles Henderson, one of Hollywood's top-flight vocal coaches—who has worked with Bing Crosby, Dinah Shore, Frances Langford, Kenny Baker, etc. These short-cuts to success teach you how to make the most of what you've got! Full price, ONLY **$3.95**. Order "How to Sing for Money." Circle **No. 29** in coupon below.

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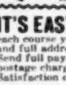

Chemical and trade information—up-to-date & reliable—on cosmetics, paints, cleaning compounds, insecticides, fertilizers, inks, lubricants, beverages, drugs, etc., etc. Only **$3.95** complete. Satisfaction or refund. Order "2000 Money-Saving Formulas." Circle **No. 48** below.

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210 South Clinton Street, Chicago 6, Ill.

Please rush me the practical concentrated courses I have circled below. I understand each is complete and that this is the full price, nothing more for me to pay. I have the right to examine everything you send me for 10 full days. Then if I am not **more** than satisfied in every way I will return the material and you **guarantee** to make complete immediate refund, without question or quibble. (Draw a circle around the number of each course you want.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

☐ I enclose $__________ in full payment. Ship entirely postpaid.
☐ Ship C.O.D. for $__________ plus postage.

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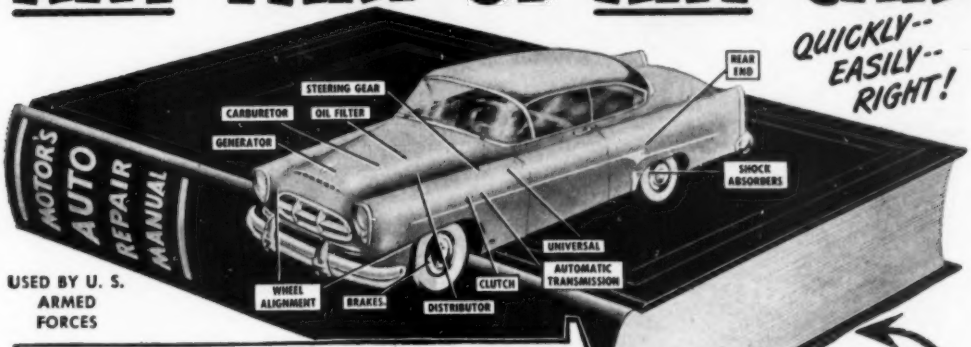
210 S. Clinton St., Dept. KW-1. Chicago 6, Ill.

HOW TO FIX

Brakes, Clutches, Transmissions, Rear Ends, Carburetors—*Yes,*

ANY PART OF ANY CAR

QUICKLY-- EASILY-- RIGHT!



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Address.....

City.....State.....

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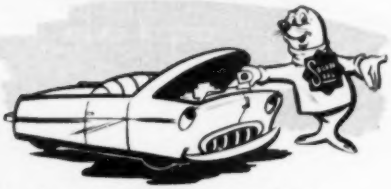
After hard Summer wear... your car's COOLING SYSTEM needs Solder Seal Care!

3 TIPS FOR CAR CARE

Avoid overheating—loss of anti-freeze with Solder Seal

Chemical Tools

1. Before you add anti-freeze DO THIS...

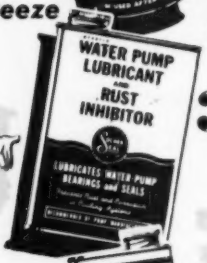


Dissolve and flush out rust, scale and sludge with

SUPER SOLVENT

This powerful cleaner breaks down rust, dissolves scale and sludge so that all are flushed out easily.

2. When you add anti-freeze DO THIS...



Prevent new rust, corrosion . . . add

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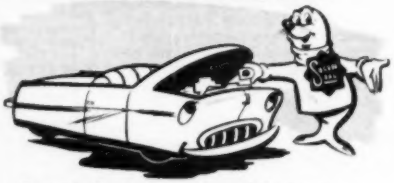
3. Anytime a leak appears DO THIS...



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This super penetrant loosens rust and corrosion *in seconds*. Makes mean jobs easy. Loosens rusted bolts, nuts, joints—quickly frees "frozen" parts *without breakage*. Cleans, protects metal surfaces, prevents formation of rust and corrosion. Safe for all metals and alloys.

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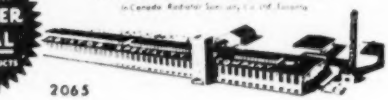

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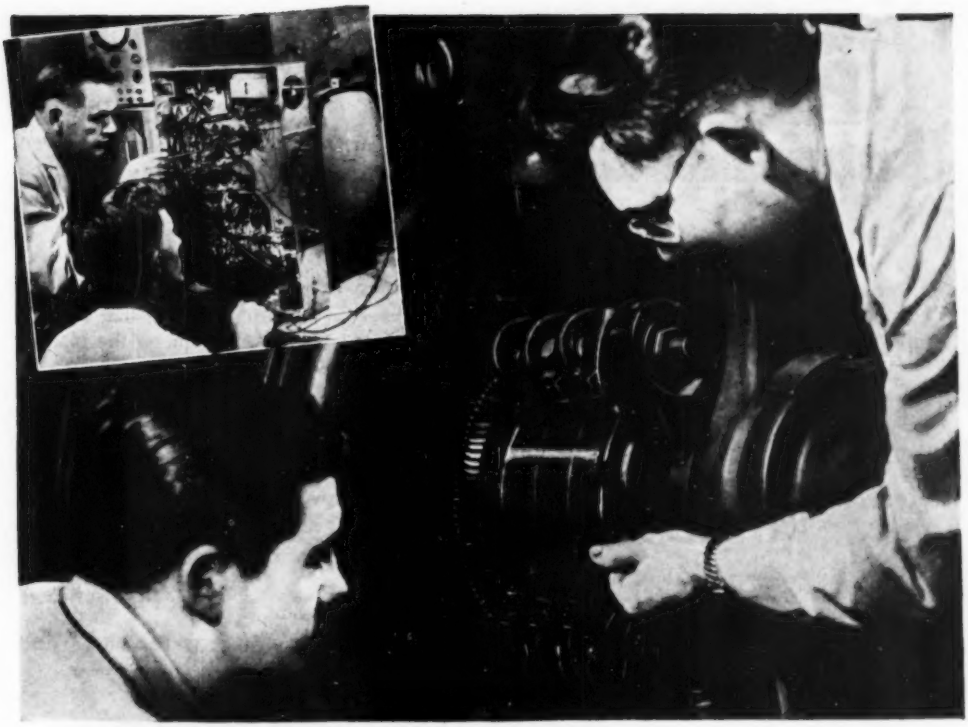

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Letters—

Help for Inventors

I have an invention in mind that I would like to patent and then put on the market.

Would you please tell me the best way to go about it?

V. C. Bullard Sr., Fort Worth

Please see page 136.

Contest Teaches Good Driving

As a onetime contestant in a local teen-age driving road-e-o, I thoroughly enjoyed your August article on how America's best young driver is selected. This contest is one of the best things ever thought up to teach good driving. I wish all teen-agers would try it—and all adults, too.

Roger L. Bacon, Boston

Can Accelerating Save Gas?

An automotive engine's efficiency increases as the load increases (up to about 80 percent of maximum load), so it seems to me that you could *save gas* by almost maximum acceleration as long as you are in high gear. Does this sound reasonable to you?

Rudy R. Mueller, San Antonio, Tex.

In a paper entitled "150 Miles Per Gallon Is Possible," an investigator told the Society of Automotive Engineers in 1950 that the least fuel was used when accelerating by having the throttle wide open or nearly so.

Against Turn Signals

I suppose I am just a sorehead, but I would like to put in my nickel's worth on

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

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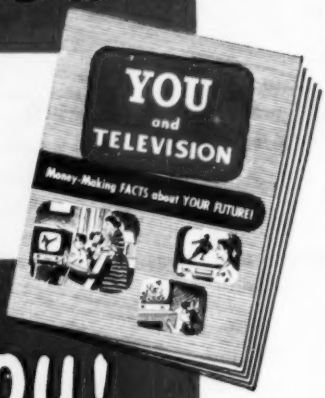

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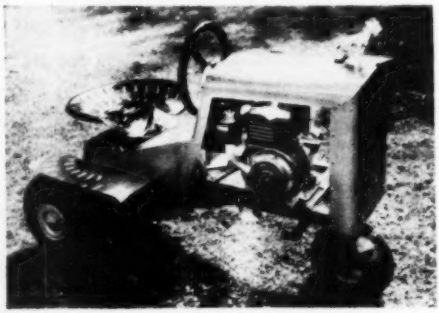
inventions that should never have been invented [PSM, Sept., p. 10]. The one that is a particular source of anguish to me is the electric turn signal for automobiles. People turn 'em on, they stick, and they go on flashing a false prediction for miles. I followed one motorist on a turnpike for 75 miles, his turn signal flashing the whole distance. That's dangerous. What's wrong with the old reliable, nonsticking hand signal?

IRA C. BOLLART, St. Louis

Any others?

Father-and-Son Tractor

Enclosed is a photograph of a small tractor I made for my son—and, needless to say, myself too—from the plans in your March issue [p. 183]. Practically the only changes I made were using a Briggs & Stratton engine and adding fenders instead of the chain



guard. As you can see, it turned out pretty well, and most of all I am pleased with the work it can do.

DONALD O. BITTLER, Elmira, N.Y.

Biggest or BIGGEST?

So sorry, but in your August issue [p. 128] you stated that the USS *Forrestal* is the biggest ship ever built. How about the two 80,000-ton Japanese aircraft carriers sunk by American subs near the end of World War II?

J. A. THOMPSON, Ft. Thomas, Ky.

Depends on how you interpret "biggest"—displacement or over-all size. Actually, three Japanese warships outclassed the Forrestal's *60,000-ton displacement: the 72,809-ton battlewagons* Yamato *and* Musashi, *sunk by our carrier-based aircraft, and the 71,890-ton aircraft carrier* Shinano, *sunk by the submarine* USS Archerfish. *The British luxury liners* Queen Mary *and* Queen Elizabeth *also outweigh the* Forrestal *in displacement.*

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

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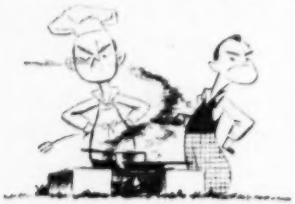
But no ship has ever approached this new U.S. carrier's 1,039-foot length and 252-foot flight-deck width. The Japanese battleships—the Navy knows of no 80,000-ton aircraft carriers—were 863 feet long and had a beam of 127 feet. Shinano *was converted from the same class.*

Burn Off the Zinc

Your article on how to make outdoor fireplaces [July, p. 143] suggested using refrigerator grates but didn't point out that these are often zinc-coated. Heated by the



fire, such grates give off poisonous fumes. Eventually the zinc burns off, but stove grates are better as they have no zinc.

CARL HALD, Seattle

Zinc-coated grates should be thoroughly burned off—in the open air—before food is placed on them.

That Grasshopper Was Real

I always read Gus Wilson's adventures with great interest. However, the idea of a grasshopper's shorting a spark plug without getting hurt [July, p. 128] is too fantastic.

CLIFFORD MARTIN, Torrington, Conn.

Martin Bunn, Gus's literary godfather, insists that he saw it happen.

He Lolls in a Homemade Chair

I thought you might be interested in hearing about my version of the reclining chair which you showed me how to make in June [p. 210]. I substituted two-inch red-oak slats for the plastic-clothesline ribbing suggested, and I plan to have a two-inch pad made to cover the chair.

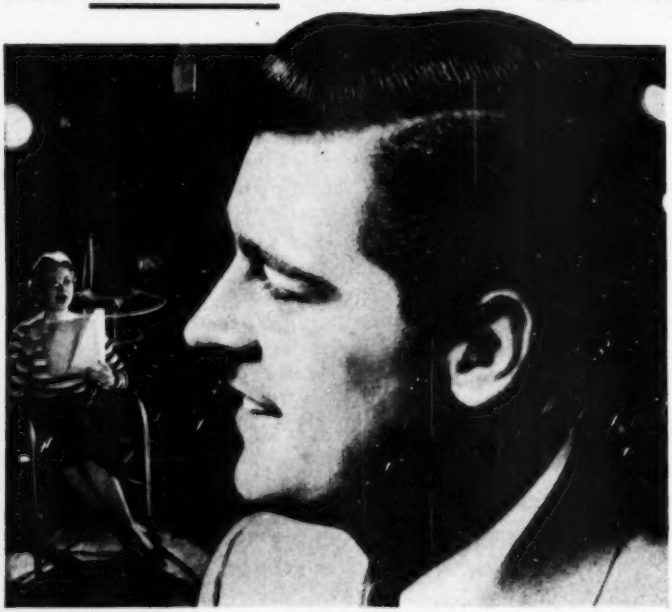
It cost me $15 to make the chair, and I consider it an investment well worth while.

W. J. HUPER, Wichita Falls, Tex.

Scales Can Be Fishy

I wouldn't want to buy anything by weight from the artist who illustrated the

NEW GREASELESS WAY TO KEEP YOUR HAIR NEAT ALL DAY



Dick Hageman, WLW's "Mr. Television," says: "Vitalis keeps my hair neat without a trace of grease."

New Vitalis with V-7 makes even dry, unruly hair easy to manage

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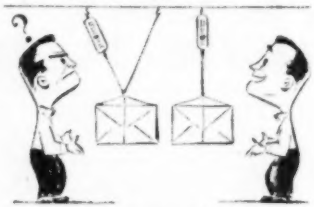
little item "Piece of String Doubles Scale Capacity" on page 173 of your August issue. In the drawing, the angle between the two segments of string is about 40 degrees. Constructing a parallelogram of forces on this angle, I figure the reading on the spring scale would be 5.32 pounds when a 10-pound weight is hung on the ring. Doubling this you would get a false "weight" of 10.64 pounds. And the scale reading will become greater if the points of suspension are more widely separated.

F. W. KUHLMANN, Long Beach, Calif.

All we can say for our drawing is that anybody who uses the method shown will never get a package back marked "insufficient postage." Readers who called us to task are 100-percent right. The method of doubling scale capacity by hanging a package mid-



way along a string looped between the scale and an overhead hook is accurate only when the angle between the two sections of string is zero.

Safer Ground Connection

The Tesla Coil article in August [p. 190] suggests fastening the ground wire to the cover screw of the outlet. That is all right with BX or conduit wiring, but with other types the box itself may not be grounded and so would afford no protection.

CHANDLER BROOKS JR., Hapeville, Ga.

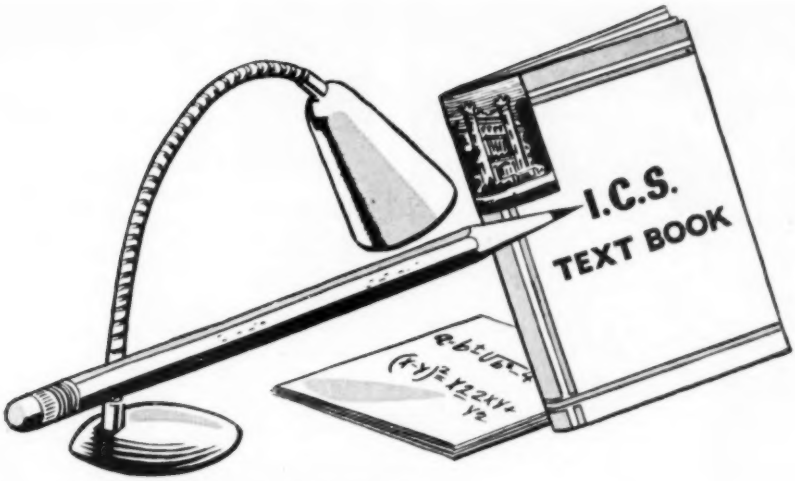
You're right: a water or heating pipe provides a more reliable ground.

Copter Kite to Join CAP

I really enjoyed your July article, "He Rides a Kite" [p. 98]. Then, after a few days of dog-earing the pages, I had a miniature brain storm: I am in the Civil Air Patrol in my town, and now we are considering building the motorless man-carrying helicopter as an instructional aid. It should prove a lot of fun as well. Maybe other organizations will use it as a club project.

JACK ROREM, Kankakee, Ill.

More letters on page 26



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- ☐ Chemical ☐ Civil
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- ☐ Business Management
- ☐ Business Mathematics
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- ☐ Marketing & Production
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- ☐ Leadership
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- ☐ Office Communications
- ☐ Office Forms
- ☐ Office Management
- ☐ Office Reproduction
- ☐ Personnel Management
- ☐ Supervision

PERSONNEL
- ☐ Collective Bargaining
- ☐ Employee Relations
- ☐ Employment Practices
- ☐ Incentive Wage Systems
- ☐ Job Analysis & Evaluation
- ☐ Labor Relations
- ☐ Organized Training

RETAIL
- ☐ Advertising
- ☐ Bookkeeping, Business Forms
- ☐ Buying, Pricing
- ☐ Department Store Operations
- ☐ Retail Merchandising
- ☐ Retail Salesmanship
- ☐ Window, Counter Display

SALESMANSHIP
- ☐ Creative Salesmanship
- ☐ Real Estate Salesmanship
- ☐ Sales Analysis
- ☐ Sales Letters
- ☐ Sales Management
- ☐ Sales Records and Reports
- ☐ Selecting Salesmen
- ☐ Supervising Salesmen
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- ☐ Business English
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- ☐ Freight Class. Rules
- ☐ Freight Services, Facilities
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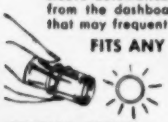

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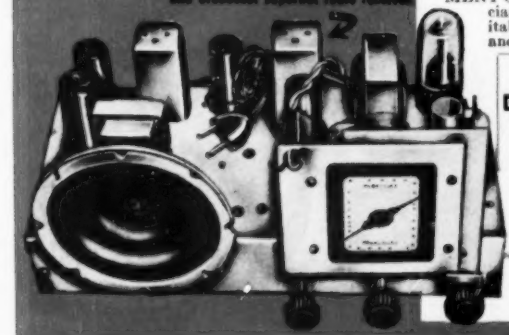

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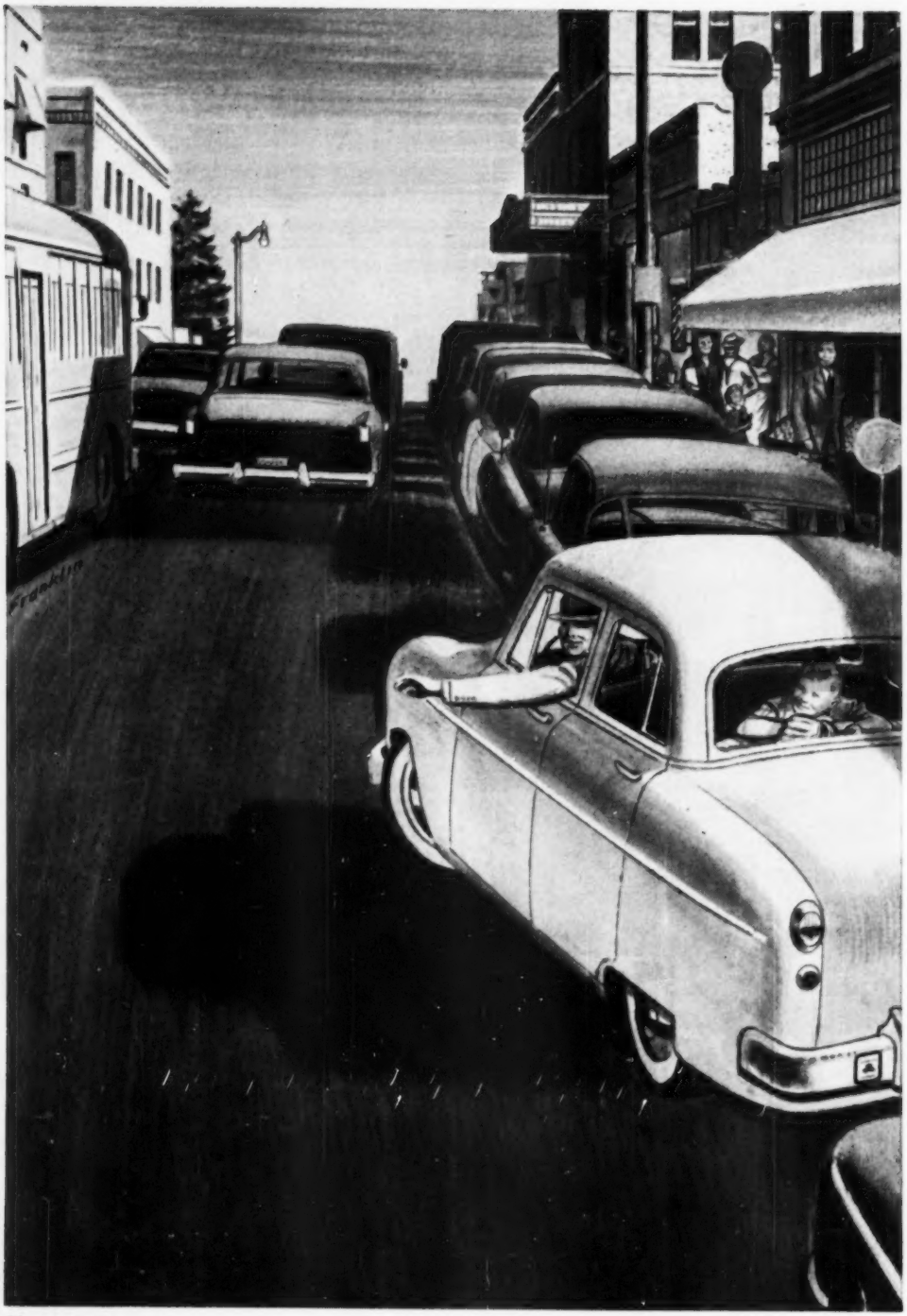

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The Science in Science-Fiction

John Lear's article ["Let's Put Some Science in Science-Fiction." PSM, Aug., p. 135] is excellent. But . . . perhaps what we need is more fiction in science-fiction. By this I mean good fiction: believable, entertaining reading . . . Accurate science is fine—but secondary.

If I must, I will accept hyperspace, time travel—even invasions by masquerading lima beans. But please, none of the crude, stereotyped characters and trite situations that so often inhabit the pages of bad fiction of all kinds.

PHIL GIBSON, Rochester, N.Y.

Does Mr. John Lear expect folks to learn broncobusting out of Westerns, navigation from sea stories or criminology and law from whodunits? Yet he says science-fiction's gotta teach science, or else dreadful things will happen.

JL wants SF to stimulate our youth to "think imaginatively," to show them "man is responsible for his acts," to "substitute hope for horror" and to prepare people to make traffic judges out of the very robots that JL assures us (elsewhere in his article) can't think nohow.

Let SF alone. But let's put some science in JL.

D. STOKES, Washington, D.C.

Hear, hear, Mr. Lear! You tell 'em! I read science-fiction, and I'd like to be able to read more of it but I can stand just so much of the ultra-fantastic stuff.

I'd like to see all science-fiction stories labeled by degree of fantasy, so that the reader (me) would have a fighting chance to pick out the more plausible ones and pass the others by.

EARLE W. THOMPSON, Los Angeles

Mr. Lear is forgetting about the average person. When I pick up a science-fiction book, I'm not looking for a book crowded with scientific theory and terms; I'm looking for pure, simple enjoyment.

Some of the best SF stories in the past have been based on detective and other such themes because people enjoyed them, not because they were filled with instruction in science.

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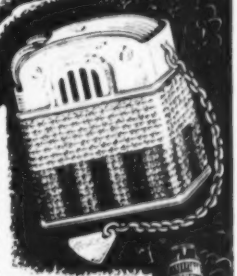

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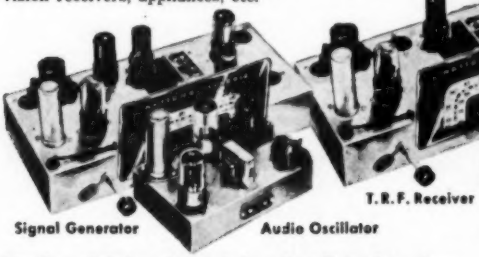

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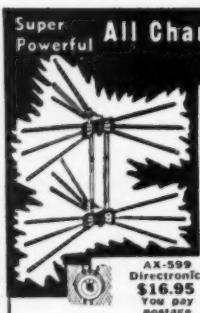

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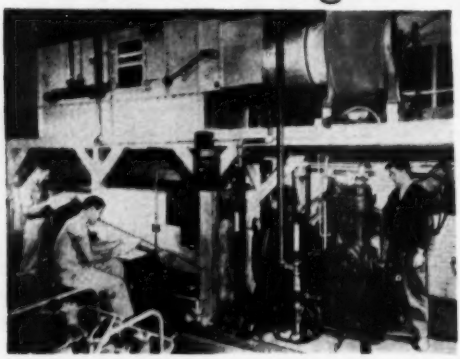

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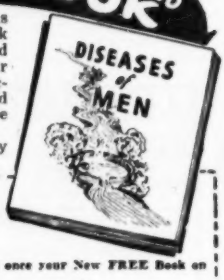

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3. **WIDER GAP ALLOWED** New design improves slow speed, idling performance.
4. **100% INSPECTED TESTED** Every LIFE-TIME Spark Plug must pass individual inspection and testing.

For the first time you can now put a spark plug in your car, truck, boat or industrial engine, which was designed from the start to use fully and economically the *modern high-octane leaded fuel you are now using.*

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Regardless of how well your car is tuned, you may be wasting one gallon in every ten you pay for—due to faulty spark plugs. Rapid deterioration is the key to this but yearly waste of your dollars.

"CREEPING PARALYSIS"

You can always feel a complete plug failure. But, you may not notice the "creeping paralysis" of gradually disintegrating plug electrodes, carbon build-up, gradually widening gap, all of which throw off timing, drastically reduce power, cause missing, slow and uneven acceleration.

FIRST 17 PT. ROTATING SPARK

For years automotive engineers have been recently aware of the crying need for a vast stride forward in the design of the spark plug—UP UNTIL NOW THE MOST OFTEN REPLACED PART OF YOUR ENTIRE AUTOMOBILE! The 17 PT. LIFE-TIME SPARK PLUG is our Guaranteed answer to this need. The LIFE-TIME Spark Plug is the final result of world-wide research and development which has gone from the original 3-electrode plug through a wide variety of double and triple electrode systems until the practical application of the full 360 degree rotating spark perfected in the LIFE-TIME plug. The new principle of full rotating spark gives more complete firing, is vastly superior to expensive platinum points once used in aircraft.

ONCE COST $17 EACH!

The LIFE-TIME Spark Plug has been brought down from $17 each to a cost of just 98c apiece—an amazing example of U.S. production methods and know-how!

YOU RECEIVE BY MAIL THIS MATCHED, REGISTERED SET You receive your matched, registered set of LIFE-TIME Spark Plugs of proper series (heat range and gap) for the car you indicate in coupon below.

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DEAR CAR OWNER: The 17 PT. LIFE-TIME Spark Plug has been my baby now for five years. During this time the big problem has been, "How can we take this remarkable plug out of the special race, test and economy-run class and put it in your car at your price?" Time and ingenuity have licked this problem. I hope you will write me about your personal experience with it, and I will greatly enjoy hearing from you. Many thanks!

Frank E. Williams

FRANK E. WILLIAMS, M.E.
Inventor of Life-Time Spark Plug

WHAT DOES 17 PT. FIRING MEAN? Note construction closely. A completely circular arcing area consisting of four concave segments (electrodes). Distance to the center electrode being equal at all points, **electricity has the property of arcing from the coldest point. Electricity also arcs more readily from the apex of two planes than from the face of a flat metallic surface.**

See above that there are 16 apexes (places where two planes meet) on the outer circular electrode of the LIFE-TIME Spark Plug **all exactly the same distance from the center electrode!**

17 ARC POINTS—360 DEGREES Normal heat and spark erosion are spread around the entire 360 degrees of the circular electrodes **and** around the entire circumference of the center electrode! **Firing simultaneously from 2 or more** of the 16 outer points, LIFE-TIME plugs give a larger spark for more complete combustion.

FULL ROTATING SPARK ALLOWS OVERALL COOLER ELECTRODE TEMPERATURE FOR GREATLY INCREASED LIFE. This allows the use of a hotter spark to avoid fouling, yet the cooling effect of the multiple electrode system (plus superior heat conductivity) minimizes the common faults of burning, erosion, blistering and insulator failure.

A larger, more powerful spark every time gets more miles from every gas dollar you spend. Giving better gas economy, increased power, acceleration and top speed. Compare this principle with the conventional 2-point spark plug design.

1. MAKE THIS TEST WITH YOUR OWN CAR! Time your acceleration from 0 to 60 mph with any other spark plug. Then time 0 to 60 mph with LIFE-TIME Spark Plugs in your car. This test performed in a hopped-up 1952 Merc **cut 2 full seconds off the time** when LIFE-TIME plugs were installed!

2. MAKE THIS TEST WITH YOUR OWN CAR! At the time you order your set of LIFE-TIME Spark Plugs fill your tank with gas and figure your present miles per gallon. Figure your miles per gallon immediately after you install LIFE-TIME plugs and **again** after your LIFE-TIME plugs have gone the same number of miles as your present plugs. Our tests indicate that **both tests** with LIFE-TIME Spark Plugs will show from 4% to 13.5% greater gas mileage than with any conventional spark plug.

DEALERS AND DISTRIBUTORS Write us today for sales details on the revolutionary new LIFE-TIME Spark Plug.

Life-Time Spark Plug Division—CONTINENTAL MANUFACTURING CORP.
Department PB-10, 10411 W. Washington Blvd., Culver City, Calif.

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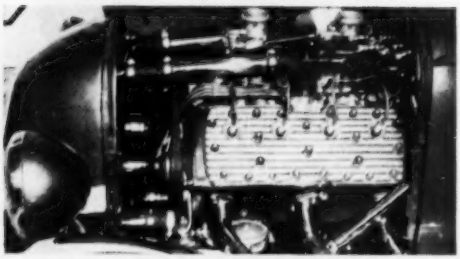

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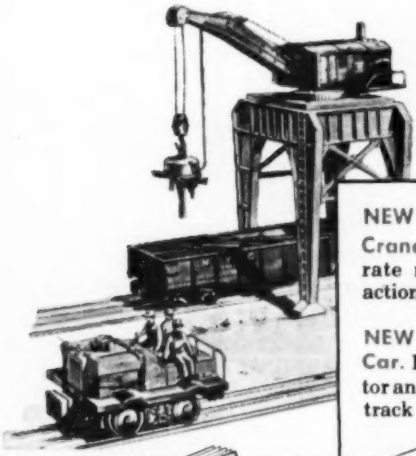

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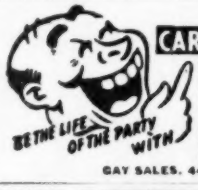

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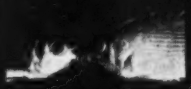

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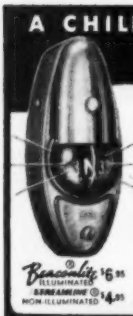

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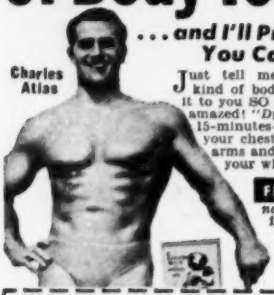

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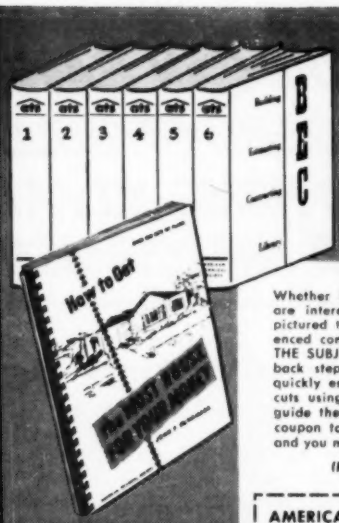

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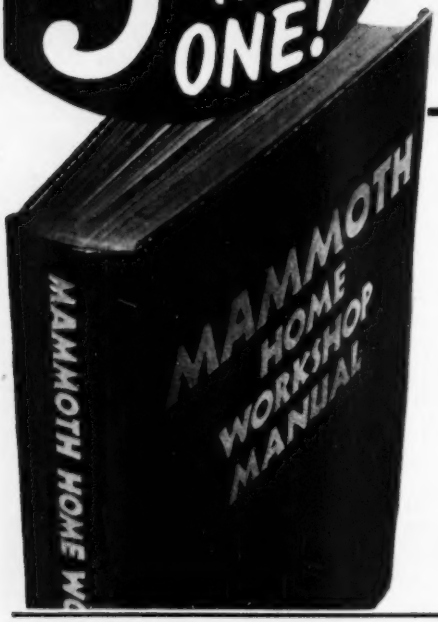

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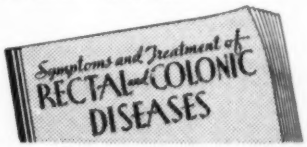

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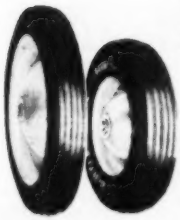

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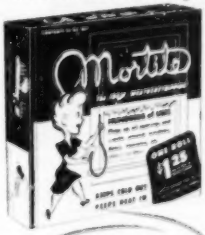

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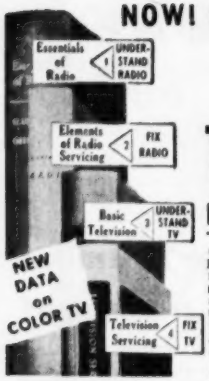

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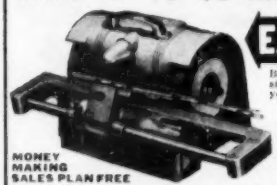

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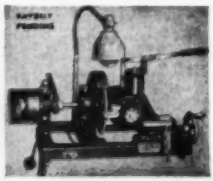

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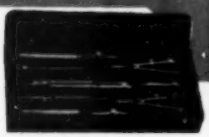

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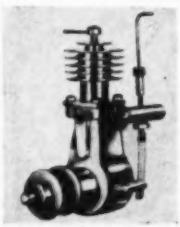

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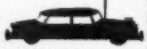

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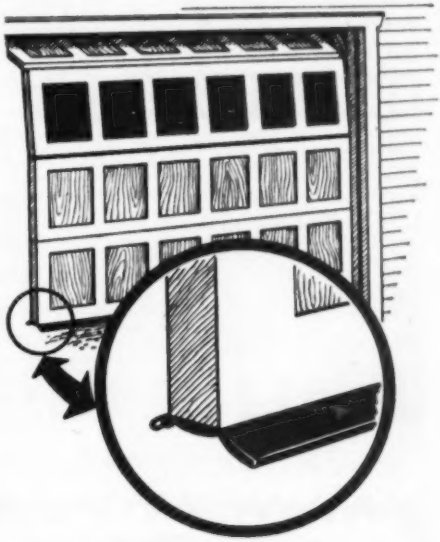

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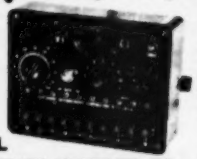

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650x16	5.55	670x15	5.15	700x17	8.75	750x20(8)	12.65
650x16(6)	7.05	710x15	5.25	750x17	10.55	825x20	17.55
700x16	6.15	760x15	5.75	750x15	10.45	900x20	17.65
750x16(6)	8.35	800x15	6.05	825x15	10.45	1000x20	16.55
550x18	3.95	820x15	6.15	600x20	8.75	1100x20	17.05
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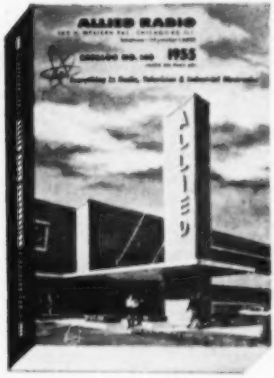

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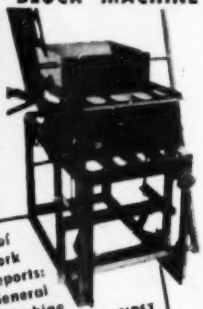

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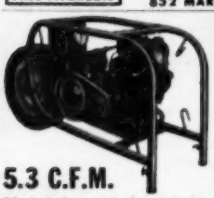

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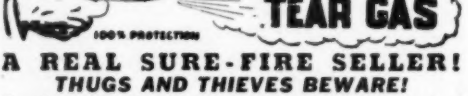

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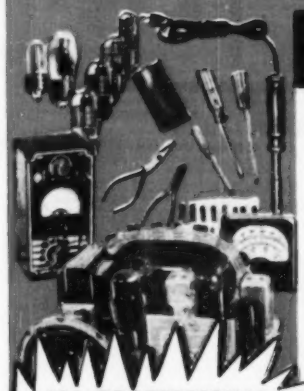

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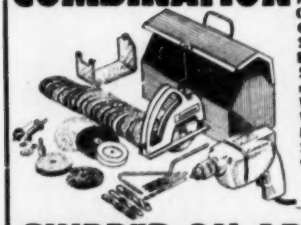

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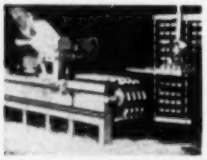

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RAISE Earthworms! Terrific! Essential information plus story, "An Earthworm Turned His Life." Send dime. Earthmaster System, 14H, El Monte, Calif. Hurry!

38 MONEYMAKING OPPORTUNITIES

SPARETIME Profits Taking Subscriptions. All Magazines. Wholesale Catalog Free. Cassell Publishers, Westfield, N. J.

FREE! "301 Profitable Small Businesses!" Amazing shoestring plans! Work Home! Start Sparetime! Deumant Surveys, Kenmore 23-T, New York.

NEW 7"x11" Ultra-Blue Signs, 7c, retail 50c. Sample free! Lowry, 812 Broadway, Dept. 817, New York 3.

DETECTIVES Earn Big Money. Experience unnecessary. Detective Particulars free. Wagoner, P-125 West 86th, N. Y. 24.

MAKE money addressing envelopes sparetime. Glenway, 5713 Euclid, Cleveland 3, Ohio.

WIN contest money. General Contest Bulletin gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609-A East 5th, Duluth, Minnesota.

MAKE extra Christmas Money selling subscriptions spare time. Supplies free. Desales Magazine Service, 60 East 42nd Street, New York.

FRENCH-Type Perfume Really Sells!! Free information, or, $1.00 for 1½ dram "Flacon". Elliott-Stuart, 4616-B Hollywood Blvd., Hollywood 27, California.

SELL-buy Titania Gems. More brilliant than diamonds. $9.75 carat wholesale. Free Catalogue. Diamonite, 1404-S Mitchell, Oakland 1, California.

START A Buying Service, buy wholesale thousands nationally advertised products. Make big profits selling at sizeable discounts. Postcard brings details. American Buyers', 630-S Linden, Buffalo, N. Y.

EARN Ready Cash Addressing Envelopes at Home—Our Instructions Show You How—Y. Wilson Business Service, 7372 Melrose Avenue, Los Angeles, California.

SCHOOL Seniors — Sell Classmates America's most beautiful Graduation Name Cards. Largest selection. Highest commission. Outsells all others. Free sample kit. Printcraft, Dept. P, 1509 Maple Street, Scranton 5, Penna.

IMPORTED, Beautifully hand tooled genuine leather billfolds, agents, wholesale, retail. J. B. Gardes, 1121½ South St., Long Beach, California.

SEND out postcards. Cash daily. Bicorp, 143 Belmont, Belmont, Mass.

BUY wholesale direct! Save up to 66⅔% on nationally advertised Appliances, Homewares, Watches, Cameras, Sporting Goods, Toys, Giftwares. Free Catalog. Wholesalers Mart, Box 6125FR, Houston, Texas.

BAR items and Bar gags at wholesale, resell at 40% profit. Collins Products, Dept. 2, Box 465, North Hollywood, Calif.

"WHERE To Find Opportunity Today". Action brings results. Only $1.00. Hanton Trading, 1278 East 24th Street, Brooklyn 10, New York.

WHOLESALE Catalog! 30-80% Discounts! Nationally Advertised Appliances, Gifts, Watches, Cameras, Tools, etc. Start Your own fully self-operating mail order business without capital! No experience necessary. Wholesale starting kits furnished. Outline of unique automatic sales plan included. Consolidated Distributors, Division 122, 21 Lafayette, Paterson 15, New Jersey.

SPARETIME income selling genuine marcasite cuff links, tie pins, religious articles. Actual size photos and prices $1.00. F&S Specialty, Box 275, Philadelphia 5, Penna.

SPARETIME Fishworm Breeding pays to $850.00 per month. Information, details, "How", Dime. Start now. Caldwellz, Barwick, Georgia.

BUY Wholesale! Thousands nationally advertised items. Save—Make Money! Free Details. Durex, Box 672-PS, Chicago 90.

ALUMINUM Awnings. Sell yourself. Sell neighbors. Factory prices. Write All Weather, Box 10254, Tampa, Florida.

FREE Folder—How To Sell Books—Merchandise By Mail. Terrific Profits. Everything Supplied. Anderson, 727-C Carney, Marinette, Wisconsin.

MAIL Letters Featuring Real Merchandise—Get $10 orders in Every mail—100% profit. Everything furnished. Write Everett A. Anderson, Box 3, Wheeler, Ore.

EXTRA Money At Home. Grow Miniature Christmas and ornamental trees in pots. Write for information on our plan and Kit. Don Pedro Farms, Rte. 2, Box 1007A, Stockton, California.

MAKE to $4.50 hour doing common pen lettering. National Artists, 801½-C North Marsalis, Dallas 3, Texas.

EARN Money Evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 2, Wisconsin.

GROW Mushrooms, Cellar, shed, and outdoors. Spare, full time, year round. We pay $3.50 lb. We paid Babbitt $4,165.00 in few weeks. Free Book. Washington Mushroom Ind., Dept. 179, 2954 Admiral Way, Seattle, Washington.

FUTURE Security! Learn Watch-Clock Repairing at home. Inquire. Modern Technical Supply, 55-PS West 42nd Street, New York 36.

$60.00 WEEKLY addressing postcards. Instructions 50c. Roland, Box 381, Parkland, Pennsylvania.

ATTENTION: Typewriter owners. Make handsome profits. Write today. Groves Company, 682 Hastings 3, Nebraska.

CASH for used watches, jewelry. Write Southern Watches, Gray, Georgia.

FREE Folio "Startling Unlimited Vacations Plan." No merchandise, equipment. Unknown! Works itself—home! Proven successful. Haylings-PS3, Carlsbad, Calif.

NEWLY Found Money in Whitehall's exclusive line of Photo Novelties, Photo Finishing, Jewelry, Christmas and Everyday Greetings. New Items never before shown. Send for free samples. Be among the first to make Big Money with Whitehall's Photo Line. Whitehall Studios, Inc., 25 Main Street, Elmira, New York.

BIG Profits In Spare Time! I'll send, on Free Trial, Assortment Full-Size Samples fine Foods, Household Necessities to ambitious Men-Women who need money. Friends, neighbors buy eagerly. Send no money. Just write Blair, Dept. 55MT-2, Lynchburg, Va.

URANIUM, How and Where to find it—$10,000 bonuses, fortunes waiting you, success can be yours, act now $3.95. United Engineers, Dept. F1, Box 1293, Salt Lake, Utah.

$200 MONTHLY Possible Raising Earthworms! Backyard, Garage, Basement, Complete, Illustrated Booklet explains raising, feeding, packing, marketing. 25c postpaid! Ozark Worm Farm-V, Willow Springs, Missouri.

MAKE money copying music. Instructions and materials $1.95 postpaid. Clayton's, 684-B N. Sangamon, Chicago 22.

POPULAR SCIENCE OPPORTUNITIES

MAKE Money, easily, quickly, raising parakeets for our guaranteed market. Starting stock furnished. National Aviaries, Box 4097-S, San Diego 4, California.

$15 AN hour preparing tax returns. Become tax expert. State approved training program. Union Institute, 1-O, Lakewood, New Jersey.

DOLLARS by mail. Spare or full time. Easy homework. Box 191, Beaver, Pa.

WEEKLY extra income mailing circulars for advertisers. For information write Enterprise, 2150 Sanford, Mattapan 26, Massachusetts.

EXCEPTIONALLY Profitable Home Mail-order Business Plans. Lewis Bartlett, Richland Georgia.

MANUFACTURE Rhinestone and Pearl Jewelry at home. Latest creations, tremendous profits, no skill needed. Postcard brings illustrated catalog of settings, stones, etc. A. V. Cutt Co., Inc., 210-H Fifth Ave., New York 10, New York.

FREE Book "505 Odd Successful Businesses." Work Home! Expect something Odd! Pacific-35C, Oceanside, Calif.

NEED extra money? New plan. No investment. Sparetime. Sample, details free. Transamerican, Box 815-B, Atlanta 1, Georgia.

PRESERVE Living Flowers to last for years. Interesting hobby. Make money too. Free details. Goll Enterprises, 124-S Washington Avenue, Patchogue, New York.

METAL Specialty Business pays big. Write Fran Council, Box 150, Wildwood, New Jersey.

MUSIC at your door!—Can put dollars in your pocket! Sensational new chimes plays favorite melodies. Sells on hearing. Only $9.95. Details Free. Westwin, 647-A Goulding, Winnipeg, Canada.

WATCHES! Watches! Tremendous discounts. Free particulars. Econ-O-Mart, Box 535, Morristown, New Jersey.

BUY Wholesale cash or credit. Leopold's, Box 1113, Columbus 16, Ohio.

OPPORTUNITY seekers! Fabulous possibilities. Details $1.00 M.O. Welcome Projects, P. O. Box 654, Altoona, Penna.

WE pay cash to hand out circulars. No selling. Wilco, P. O. Box 8032, Nashville 7, Tennessee.

MONEY Making plans and manuals. Literature Free. Kaiser, 136C Gameweil, Hackensack, New Jersey.

$35 WEEKLY addressing envelopes. Instructions $1, refundable. Adservice, Spring Valley 36, New York.

FREE! Complete Mailorder Business! Terrific Profits! No Investment! VitaMins, 2908-P8X Beverly Boulevard, Los Angeles 57.

ADDRESS Envelopes at home spare time $50.00 weekly possible, instructions $1.00. Fisher-Z, Box 4044, San Francisco, California.

39 FORMULAS, PLANS, ETC.

FORMULAS—All kinds. Latest products. Literature free. Kemico, Park Ridge 15, Ill.

REAL Manufacturing Formulas List. Free. Cumming, Chemist, Gordon Avenue, Syracuse 4, New York.

FREE Formula Catalog. Anything analyzed $35.00. Western Chemical, Salem, Ore.

1 & 2 INGREDIENT Formula collection. $3.00 value only $1.00. Richmond Enterprises, Box 1003, Augusta, Georgia.

MODERN Formulas. Literature Free. Jack, Chemist, 5138 Gainor Road, Philadelphia 31.

LATEST modern real manufacturing formulas. list free. Moon, Martville, N.Y.

ANY Formula $3.00. Catalog — Mfg. Treatise 10c. J. Belfort, 192 N. Clark, Chicago 1.

MODERN formulas for today's fastest selling big-profit products. Literature free! Miller, Chemist, 1517-A, Tampa, Florida.

40 PLASTICS

PLASTICS home-craft course for Men and Women. Tells and shows how to make hundreds of fast selling plastics products. All plastics and materials for 23 projects included in course. No special tools needed. Course pays for itself. Write for Free booklet. Interstate Training Service, Dept. D-2-K, Portland 13, Oregon.

HIGH Profits—Jewelry, Gifts, Novelties. Free Catalog. Pilot Plastics, 67-B Fulton, New York 38.

PLEXIGLAS sheets—cut to size—clear, all thicknesses—standard outdoor translucent colors. McClarin Plastics, P.O. Box 168B, Hanover, Pa.

PLEXIGLAS, Lucite. Square foot cost 1/16"—$1.16, 1/8"—$1.53, 3/16"—$1.88, 1/4"—$2.23, 3/8"—$3.28, 1/2"—$4.38. Colors add 10%. Send 10% for postage. Aristocrat Plastics, Inc., 55 Clarkson Street, New York City.

CASTING plastic, crystal like, new formulation, 1½ pounds liquid Numold and complete kit including colors and instructions. Start profitable hobby at home, make your own Christmas gifts. Only $6.00 postpaid. Information on request. Virginia Research Laboratory, Dept. B-10, Marion, Virginia.

UNUSUAL Christmas decorative materials included in complete plastics catalogue. Van Horn Plastics, 1905 Ingersoll, Des Moines, Iowa.

PLEXIGLAS, Fiberglas, Polyester, Acetate, Vinylite; Casting, coating plastics; Fast service, wholesale-retail prices. Catalog 10c. Gem-O-Lite, Box 6862P, North Hollywood, California.

PLEXIGLAS—any size sheet—Rod, Tubing, Dyes, Cements, Findings, etc. Free catalog. Parker Specialties Company, 9695 Monica Ave., Detroit 4, Michigan.

PLEXIGLAS, Lucite sq. ft. (12"x12") cost 1/16" $1.14, 1/8" $1.50, 3/16" $1.85, 1/4" $2.20. Add 10% for postage. Almac Plastics, 600 Broadway, New York 12, N. Y.

41 CHEMICALS & APPARATUS

NEW Idea Chemical and Apparatus Outfits for Home Experimenting Photo-Scales, Microscopes, Chemicals, Biological and Laboratory, Supplies in Small Quantities. Catalog 25c. Established 1921. John H. Winn, 124-B West 23rd Street, New York, N. Y.

DAZZLING chemical demonstrations. New manual. Many experiments unobtainable elsewhere. Spectacular volcano; cold explosive ignites in hand; luminescence; fiery smoke rings; explosive powders, etc. Full directions, only $1 postpaid. Chem-Tron, P.O. Box 16, Ft. George Sta., New York 40, New York.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 20c. Tracey Laboratories, Evanston, Illinois.

CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N.Y.

EXPERIMENTERS Supplies Catalog: Chemical, Biological, Mineralogical 10c. Refundable. Hagenow Laboratories, 2414 Clarke, Manitowoc, Wisconsin.

CHEMISTRY simplified. Systematic instruction. All ages. Fascinating. Exciting. Constructive. Practical. "Future Chemists of America" membership. Lesson free. Parkway Laboratory, R #1, McKees Rocks, Pa.

CLOUD Chambers, $9.75. Write for free specifications. Atomic Laboratories, Box 343, Berkeley, Calif.

CHEMICALS, Supplies. Catalog 20c. Laboratory Sales, Box 161-B, Brighton, Massachusetts.

AMAZING New Book of Science. Experiments, Formulas and catalogue of Laboratory Supplies. Only 25c. National Scientific Co., Dept. PS10, 2204 W. North Ave., Chicago 47, Illinois.

GEIGER Counters, $29.95 up. Free catalog. Atomic Laboratories, Box 343, Berkeley, Calif.

42 HELP WANTED

FOREIGN & Latin American Employment 1954 "Foreign Service Directory" gives Up-To-Minute Facts on Military & Civilian Construction, Government Jobs, Major Oil Listings, Aviation, Transportation, Steamship Lines, Mining, Importers, Exporters, How-When-Where to apply application forms, Hot List Firms Hiring. $1.00 postpaid. Global Reports, Box 883-S, Hollywood 28, Calif.

ALASKA!! Last American Frontier. $1.00 brings 1954 Business Directory & Government Map. Military & Civilian Construction; Homestead & Highway facts; Mining, Aviation, Fur Farming, Grazing, Timber, Travel directions. List of firms hiring. How to apply. Alaska Opportunist, Box 92-S, Hollywood 28, Calif.

FOREIGN-U.S. Jobs. So. Am., Alaska; Spain. Fare Paid. 1000's U.S. Jobs to $18,000. Trades Office, Factories. Stamped self-addressed env. brings reply. Job Opportunities, Waseca 20, Minnesota.

HIGHEST pay area, Pacific Northwest booming lumber industry. Jobs all types. Men and women. Information and listings. $1.00. Northwest Opportunities, Box 775, Portland, Oregon.

$1300 MONTHLY for truck drivers, $1400 monthly for carpenters, electricians, plumbers, mechanics. $1200 for clerks and laborers. Replacement hiring now being done. Full information and complete foreign listings, with current information on Spain, Korea, Australia, Alaska & Canada. $1.00. 10,000 men and women needed for new stateside project! Complete information and other domestic listings. $1.00. Dept. 4-J, Opportunities Unlimited, 1110 Commerce Bldg., St. Paul, Minnesota.

SEND out postcards. Cash daily. Bicorp, 143 Belmont, Belmont, Mass.

FOREIGN Employment Construction Work. If interested in foreign projects with high pay, write Foreign Service Bureau, (Dept. P.S.), Metuchen, New Jersey.

FEDERAL government jobs—information, latest openings! Clarke, 2507 Arl., Arlington, Virginia.

PIPEFITTERS, Welders, Tradesmen, Mechanics. Good job list, foreign & Domestic $1.00. Job Coverage, Box 5003, Houston, Texas.

CALIFORNIA Employment—California's population increasing over 400,000 yearly—become part of it. Have a job waiting your arrival. Complete listings. $1.00 — Satisfaction-guaranteed. Midcentury, Box 48461, Los Angeles 48, California.

MIAMI Help Wanted Columns leading newspaper, airmailed $1.00. Box 71, Miami 50, Florida.

$245 PER week overseas! Clerks, truck drivers, cooks, construction men, guards, office, laborers, carpenters, mechanics, engineers, teachers, factory workers, many others. Experience unnecessary, some jobs. 254 projects, 58 countries. Get 56 page illustrated job catalog, "Firms Seeking Applicants" bulletin, applications, complete, $1. Jobservice D-1, Box 30, Billings, Mont.

CANADA is booming. Help wanted columns airmailed $1.00. Century Agency, Box 75, Winnipeg, Canada.

ALASKAN jobs! Absolutely reliable information. Skilled, unskilled workers. $1.00. Alaskan Opportunities-(PS), Box 362, Kenmore, Washington.

JOBS That Pay To $1500 Monthly! Thousands jobs open. S. America, Europe, Africa, USA, etc. Fare paid when hired. Application forms available. All trades, Labor, Drivers, Clerical, Engineers, etc. No employment fees! Free information. Write Dept. 76D, National Employment Inform. Serv., 1020 Broad, Newark, N. J.

CLEVELAND: Best location in the Nation. Sundays Help Wanted Air Mail $1.00. Box #2519, Cleveland Hts. 18, Ohio.

POPULAR SCIENCE OPPORTUNITIES

"ATTENTION Construction Men!" Truck Drivers—Carpenters—Mechanics—Electricians—Clerks—Plumbers—Laborers—Engineers—Supervisors—Many Others. Latest Copyrighted Reports on who to contact for highest paying jobs in over 42 countries, including U.S., Spain, South America, Alaska, Europe, Africa, etc. Pay up to $1550.00 monthly. Transportation paid, income tax relief, adventure, travel, overtime, many other advantages. One year registration and advisory service. Application forms. Only service with unconditional money-back guarantee of satisfaction. Immediate service. All only $2.00. Airmail $2.25. (COD's accepted). International Reporter, Box 1047-SH, St. Louis 1, Missouri.

BIG pay construction projects U.S., Alaska, Canada. $1.00 postpaid! Model Service, Box 777-O, St. Louis 1, Missouri.

N.Y.C.—Help Wanted, Moneymaking Columns. Both airmailed $1.00. Robert, Box 213, Seaford, New York.

CONSTRUCTION News, accurate, dependable job list $1.00. Published Monthly. C.W.N. Publishing Company, P. O. Box 955, Corpus Christi 9, Texas.

43 AGENTS WANTED

AGENTS—300% profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 431-E North Clark, Chicago.

START Your Own Business on credit. Your own boss. 1661 of our Dealers sold $5,000 to $28,500 in 1953. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant, profitable business backed by world-wide industry. Write Rawleighs, Dept. J-U-PSC, Freeport, Ill.

NEW Jobs open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 28 E. Jackson, Dept. 18, Chicago 4, Illinois.

ABSOLUTELY Free—Sales Kit. Yours for the asking. Send postcard today requesting kit showing new line, belt buckles with your name or personal initials, cap badges, choice 3000 different emblems. Write Hook-Fast, Box 1425PS, Providence, R. I.

HAVE a complete store in your pocket. Buy wholesale and make big profits. Send for free general merchandise catalog now. Jay Norris, Dept. PS, 445 Broome St., New York City.

ADVERTISED watches, diamonds, pens wholesale. International, 61M Roberts, Portland 4, Maine.

MONEY For Xmas! Make $50 and more during spare time. Friends, neighbors—everyone buys from Elmira's exquisite New Sparkling Line. Imprinted Christmas Cards for As Little as 3c. Personalized Stationery, Napkins, Large Gift Wrappings with Free accessories, Ribbon Ties . . . all fine quality Money Saving Values. No experience Needed. Send Name and Address for Free Portfolios, Catalog, Assortments on Approval. Bonus Plan. Elmira's "Portable Gift Shop" Makes Money First Day. Write Today. Elmira Greeting Card Co., Dept. C-206, Elmira, New York.

IT'S so terrific you'll actually sell Thousands! Brand new $2.95 pocket check protector. Sales pouring in. A tremendous deal for you. Get your town today. Federal Products, Evanston 15, Illinois.

AT Last! Something New and Sensational in Christmas Cards. Make Extra Money Fast! Show Satins, Velours, Metallics. Gets Easy Orders. Pays up to 100% cash profit. 30 Free Samples. With name 50 for $1.50. Big line, Amazing new Glitter-Brite Ornaments, Napkins, Gifts, Stationery. Several $1.00 Boxes on approval. Puro Greetings, 2801 Locust, Dept. 441-M, St. Louis, Mo.

ANYONE Can Sell famous Hoover Uniforms for beauty shops, waitresses, nurses, doctors, others. All popular miracle fabrics—nylon, dacron, orlon. Exclusive styles, top quality. Big cash income now, real future. Equipment free. Hoover, Dept. G-101, New York 11, N. Y.

BIG Money making opportunity. Exclusive line work uniforms, Jackets, pants, shirts, coveralls. Advertising embroidered. Every business prospect. Outfit Free. Master Div., 266 Water, Ligonier, Indiana.

AMAZING Profits For You selling Sunshine Quality Christmas Cards. No investment or experience necessary. Nationally Famous 21 Cards for $1.00. Sells on Sight! Imprints. Currier-Ives. Religious. Gift Wraps, many others. Samples on approval, write: Sunshine Art Studios, Inc., Dept. PS-10, Springfield 1, Mass. Pasadena 3, Calif. (Note: East of Rockies address Springfield Office.)

CALIFORNIA sweet smelling beads, sensational sellers. Particulars free. Mission, 2328P West Pico, Los Angeles 6, Calif.

GET New Shirt Outfit Free; make $90.00 weekly on 5 average orders a day. Famous quality Made-To-Measure dress and sport shirts at $3.95 up sell fast to all men. No experience needed. Full or part time. Write: Packard Shirt Co., Dept. 743, Terre Haute, Indiana.

IMMEDIATE Success! Sensational profits! Suits $11.75, Pants 35c, Dresses 20c, Shoes 20c. Operate from store, home, car. Free catalog. Superior, 1250-B Jefferson, Chicago 7.

$200 WEEKLY. New Invention. Amazing 4-second Presto Emergency tire chains, fit all modern auto wheels. National advertising building big demand. 3 sales daily to oil stations, dealers, etc. make $200 or more weekly. Territory going fast. Write Presto Chain Co., Dept. P-31, Des Moines 2, Iowa.

FEATHERBIRD Pictures from Mexico! 100% fast, easy profits. Prompt service. Free details. Jacaman (PS-10), Box 1342, Laredo, Texas.

FREE—Big New Wholesale Catalog! Up to 50% saving for you, family, friends on nationally-known gifts, mdse: hosiery, appliances, cards, etc. Also make money selling part time! Write Today: Evergreen Studios, Box 846-AD, Chicago 42, Illinois.

SALESMEN—Show America's leading Nationally Advertised line—Novelties, Gifts, Utility Items. Big commissions advanced. Prospects everywhere. Steady Repeats. Low prices, free literature—samples. Write: Charms & Cain, 407-PS104 South Dearborn, Chicago 5, Illinois.

30,000,000 WOMEN want amazing new Automatic Refrigerator Defroster. You sell 8 out of 10 on sure-fire Free Trial. $250.00 weekly profit not uncommon. Rush postcard for guaranteed plan. D-Frost-O-Matic, Dept. T-103, 173 W. Madison St., Chicago 2, Illinois.

MAKE Money Introducing World's cutest children's dresses. Big selection, adorable styles. Low prices. Complete display free. Rush name. Harford, Dept. M-4341 Cincinnati 25, Ohio.

EASY Extra Income—Sell Sensational New Silicone Scorch Resistant Ironing Board Cover. Good Housekeeping Approved. Terrific $1.98 seller! Send for Free complete selling Kit. Sample cover $1.10. Menell Products, Dept. X-P.O. Box 431, Midtown Station, New York 18, N. Y.

FREE hosiery! Sensational new way earn to $3 hour spare time! Introduce amazing hosiery by giving away free pairs to every man and woman, regardless whether or not final purchase is made! Nationally known luxurious nylon stockings guaranteed against runs. New miracle one size two-way stretch nylon socks, fit any size. Never sags or droops. Guaranteed one full year! Buy nothing. Deliver nothing. Advance cash plus huge cash bonus to 40%. Additional hose and gifts extra bonus. Postcard brings you samples of stockings and socks with money-making outfits absolutely free. No obligation. Kendex, Babylon 74, New York.

BUY Wholesale thousands nationally advertised products at big discounts. Free "Wholesale Plan." American Buyers', 629-S Linden, Buffalo, New York.

SCHOOL Seniors — Earn sensational profits selling classmates America's most beautiful Graduation Name Cards. Largest selection. Outsells all others. Free sample kit. Printcraft, Dept. P, 1509 Maple Street, Scranton 5, Penna.

CASH in on tremendous demand for new low-priced burglar alarm for cars, homes and farm buildings. Nothing like it. Everybody wants one. 286% profit. Unique sample offer. Northwest Electric Co., 134 Main, Mitchell, South Dakota.

REAL Diamond Rings. Sell direct. Make big middleman's profit. No investment. Experience unnecessary. Free catalog, details. Gleamlight, 111-R North Columbus, Mount Vernon, New York.

SELL Advertising embroidered work uniforms and bowling shirts. Make big money full time, spare time. Huge selection of styles, fabrics, colors. Every business a prospect. Giant Panoramic Line makes sales on sight. It's Free! Write Topps, Dept. 5410, Rochester, Indiana.

EARN $100 cash and more by Christmas plus valuable contest prizes! Just take friends' and neighbors' subscription orders for all magazines. Write today for Free supplies to J. Foster, Coronet Agency, Dept. S, 488 Madison Ave., New York 22, N. Y.

BUY Wholesale—25,000 items—Catalog 25c. Matthews, 1472-A1 Broadway, New York City 36.

MAN to earn $150 up per week. Long Needed invention. Advertised worldwide. Prospects everywhere. Full or part time. Exclusive. No investment. Free use of samples. Write Red Comet, Inc., Dept. 391-M, Littleton, Colorado.

A Postcard Can Put You In A Fine Business! Complete line. Leather jackets, 160 shoe styles. Big commissions. No experience, no investment. Send postcard for Free outfit. Mason Shoe, Dept. MC36, Chippewa Falls, Wisconsin.

MAKE Money Fast—for yourself, church, organization selling friends, neighbors big value $1.00 and $1.25 Christmas and All Occasion Greeting Cards. Leading 21 card boxes. Religious and novelty assortments. Gift Wrappings, Stationery, Children's Items, Gifts, Gadgets, Deluxe Imprinted Christmas Cards. Over 200 items—profits to 100%. Experience unnecessary. Free gift for promptness. Bonus. Free Selling Plan! Samples on approval. Hedenkamp, 361 Broadway, Dept. PS-25, New York.

CALENDARS, Advertising Novelties, Matches. All styles, including Religious. Varnished, 12 sheet. Girls. Hundreds of Advertising Novelties. Book Matches, etc. Fleming Calendar Co., Promotional Division, 6539 Cottage Grove, Chicago 37, Ill.

NEW Plastic Mending Tape. Just press on! Repairs clothing instantly. Lightning seller. Samples sent on trial. Kristee 62, Akron, Ohio.

OWN your own profitable wholesale merchandising business. No investment! Sell nationally advertised Appliances, Homewares, Jewelry, Sporting Goods everybody buys. Your own name catalog in color! We drop ship. Free Catalog. General Wholesalers, Box 1195FF, Chicago; Box 3058FF, San Francisco.

APPLIANCES, Cameras, Watches, etc. Large coded wholesale catalogue! Cam Company, 6806PS-20th Ave., Brooklyn 4, New York.

FREE Full Color Catalog of 160 different ways to make extra money! Sell new type Christmas, Birthday, Get Well cards, wrappings, gifts. Big profits, plus extra cash bonus. Write for Feature assortments on approval, free samples Personal Christmas Cards, Stationery. New England Art Publishers, North Abington 1033C, Mass.

SEND out postcards. Cash daily. Bicorp, 143 Belmont, Belmont, Mass.

POPULAR SCIENCE OPPORTUNITIES

MAKE Money At Home as renewal headquarters for all magazines. Big Christmas sales profits now. Liberal commissions. Supplies furnished. Write for Free Catalog. McGregor Magazine Agency, Dept. 510A, Mount Morris, Illinois.

DON'T Be Satisfied with meager income. Earn Big Money Selling Foodmaster Salad Machines. Write Western Marketing Co., Box 451, Nampa, Idaho.

TALKING Christmas Cards say aloud "Merry Christmas". Six samples only $1. No duty, refundable. Talkie Kards, "B", Box 265, Station "B", Montreal, Canada.

MAKE 20%-50% Cash Bonus on generous cash commissions. Take orders for lingerie, blouses, guaranteed hosiery, etc., with self-selling features. Free selling outfit. American Mills, Dept. 436, Indianapolis, Indiana.

BIG profits: sell new two blade haircutting comb. Pala Combs, 420 Union Street, Farrell, Penna.

YOUR own business—Suits $1.50; Overcoats 65c; Mackinaws 35c; Shoes 12½c; Ladies' Coats 30c; Dresses 15c. Enormous profits. Catalog Free. Moro, 1218-J South Jefferson, Chicago 7.

60% PROFIT On Cosmetics—Famous nationally advertised Hollywood Cosmetics pay 60%! Make $25 day up! Hire others. For free samples, details, write Studio Girl, Glendale, Calif. Dept. PS-104.

REVOLUTIONIZES Rubber Stamp business. 100% profit. Send for Free sales plan. Fisher's, Dept. LS10, 4756 So. Central Ave., Los Angeles 11, Calif.

FREE new 1954-55 wholesale catalog Free. Appliances-Household Items-Toys-Gifts - Jewelry - Refrigerators - Radios - Air Conditioners - Washing Machines - Freezers—Hundreds of items on which you can make a handsome profit. Space on cover for your own name and address. Write to-day for big wholesale illustrated catalog Free. Halen, Inc., 125 Fifth Ave., Dept. S, New York, N. Y.

SELL memberships. Discount book Club. Professor Martin, Alsen, North Dakota.

$15 PROFIT on $19.95 sale! Luxurious stainless steel tableware, guaranteed 50 years. Can't rust, tarnish or stain. Looks like Sterling. Complete 30-piece set sells for only $19.95 your cost as low as $4.47! Become dealer, manager or distributor. Exclusive territory. Overriding commissions. Choice many proven money-making plans. Rush postcard for free outfit. No obligation. Topval Corp., Lindenhurst 11, New York.

CHAIN Saws. Wheel mounted. Timber-brush cutting. Fall-winter. Wholesale deal. Farmco-PS, Excelsior Springs, Mo.

GOLD or Silver letters, numbers. Windows, Doors, Trucks. 1" to 6". 500% Profits—Free Samples. Atlas-U, 544 West 79th, Chicago 20.

SPARE Time Money plus New Car as encouragement bonus. Amazing 60 gauge nylons 3 pairs guaranteed 3 months. Write Wilknit, 20410 Wash., Greenfield, Ohio.

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78 WATCH REPAIRING

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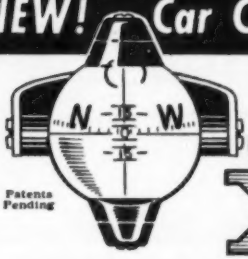

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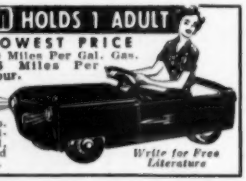

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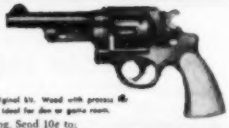

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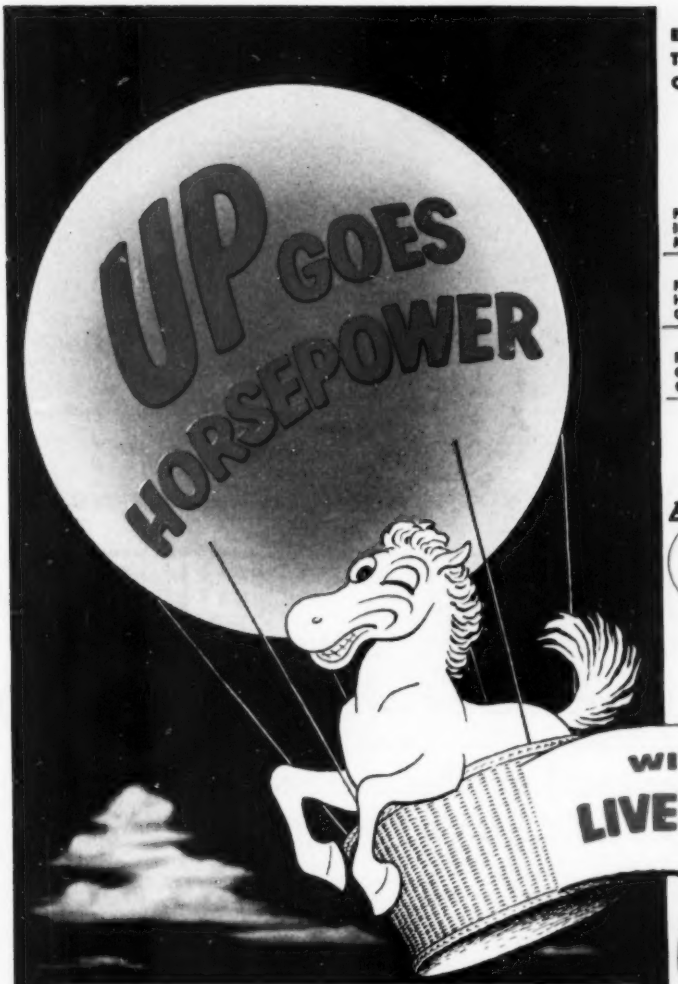
POPULAR SCIENCE MONTHLY's • • • Last-minute news & notes

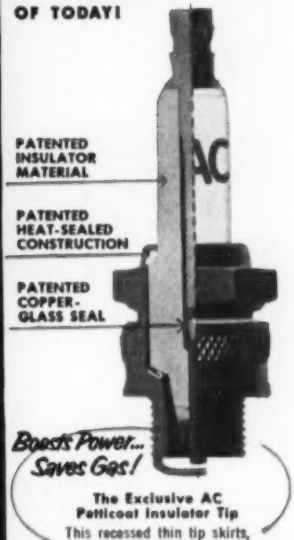
RADAR KEEPS CARS MOVING in Norwalk, Conn. It gauges traffic passing an intersection and adjusts the stoplight there to avoid jams. The equipment is made by Eastern Industries, 296 Elm St., New Haven...SILENT SOUND GUARDS AGAINST THIEVES in New York City's American Museum of Natural History. Display cases were fitted by Walter Kidde & Co., 476 Main St., Belleville, N.J., with thin metal elements that transmit and receive sound waves too high-pitched to be heard by the human ear. If a burglar puts his hand into a case, the sound wave length changes, setting off an alarm...NEW STICKUM FOR ENVELOPES won't stick when it's not supposed to, even in muggy weather. Res-N-Seal, made by Paisley Products, 1770 S. Canalport, Chicago, is tasteless, too...THE DARK GREEN AREAS ON MARS, long thought to be living plants, are more likely to be volcanic ash blown by the wind, suggests Dr. Dean B. McLaughlin of the University of Michigan...THERE'S PLENTY OF WATER ON VENUS, according to Harvard astronomers Donald H. Menzel and Fred L. Whipple.

THE SPLITTING URANIUM ATOM IS ONLY A FIRECRACKER compared to a miniature atomic explosion just discovered in photo film flown 19 miles up in a balloon. The traces it left indicate a power 50,000,000 times greater than uranium fission. The "explosive" was apparently an antiproton, which is a particle just like the protons in all matter except for its negative charge (protons are positive). Antiprotons and other "anti" particles have been a favorite theme for science-fiction writers, who call the stuff "seetee" (for contraterrene). They always said it would blow up with a big bang.

AN ALUMINUM-AND-NYLON BATTLE HELMET is in the works for American GIs. It would be a lot lighter than the present steel-plastic buckets...THE ATOM SUB "NAUTILUS" HAS RUBBER WINDOWS in its hull. The rubber panels cover sonar gear, protecting the equipment while transmitting the sound signals...MORE PEOPLE ARE FLYING FARTHER all the time. Total air traffic has tripled since 1946, while international flights have increased almost four times (see chart at left, prepared from statistics of International Civil Aviation Organization).



ENGINEERED TO THE TEMPO OF TODAY!



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This recessed thin tip skirts, but does not touch, the center wire. It heats up more quickly, burns away oil and carbon deposits which are likely to foul ordinary plugs.

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If you've seen a horse travel by balloon before, don't bother to read any farther. You know what we're going to say! Actually, putting Sparky in a balloon is just our way of telling you that with new AC Spark Plugs in your car, "Up goes horsepower!" AC engineers have designed special features into a spark plug to handle today's lively engines and lively gasolines. And the results speak for themselves. *Up to 10% more power! Gas savings of as much as one gallon in ten!*

If your car has traveled 10,000 miles or more since your last plug change, go to your nearest Registered AC Dealer. Get a new set of lively ACs.

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A new kind of personal car that combines sports-car styling and performance with passenger-car conveniences

If you've seen this sleek-looking number on the road, chances are you haven't forgotten it. A mere 34.2 inches from door top to tread, with a 102-inch wheelbase, this all-American-built personal car is already influencing future automobile design. And appearance is only half the story. Beneath the Thunderbird's beautiful all-steel body you'll find fresh new features. For example, the Thunderbird's steering wheel telescopes in or out a full three inches. The Astra-Dial Control Panel includes a tachometer, signal lights for oil and generator, and a clock with sweep second hand. The Thunderbird answers to the controls with nimble responsiveness that is wonderful to experience.

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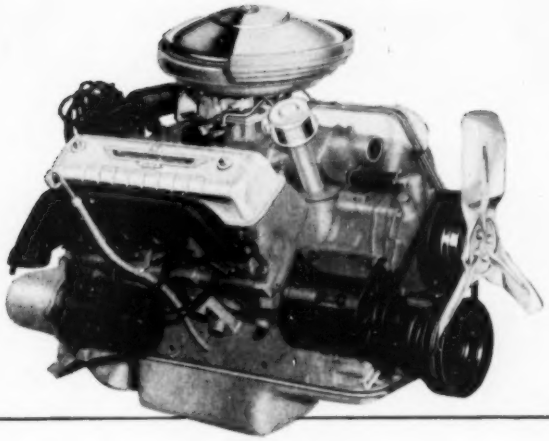

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Ford Engineers designed the Thunderbird's chassis for top strength and minimum weight . . . with an extra-low center of gravity for greater roadability. New Ball-Joint Front Suspension gives the Thunderbird excellent cornering ability. This advanced type of suspension uses ball joints that have specially shaped seats so that they can't bind or get out of line. They're completely sealed so that water and dirt can't get in.

For further information about the **FORD THUNDERBIRD** *see your Ford Dealer*

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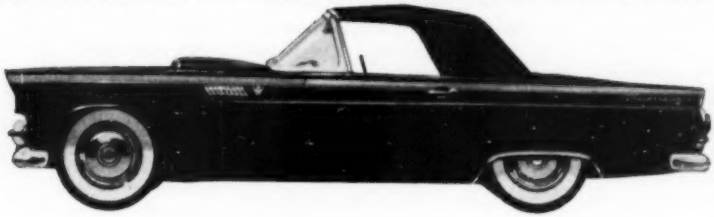

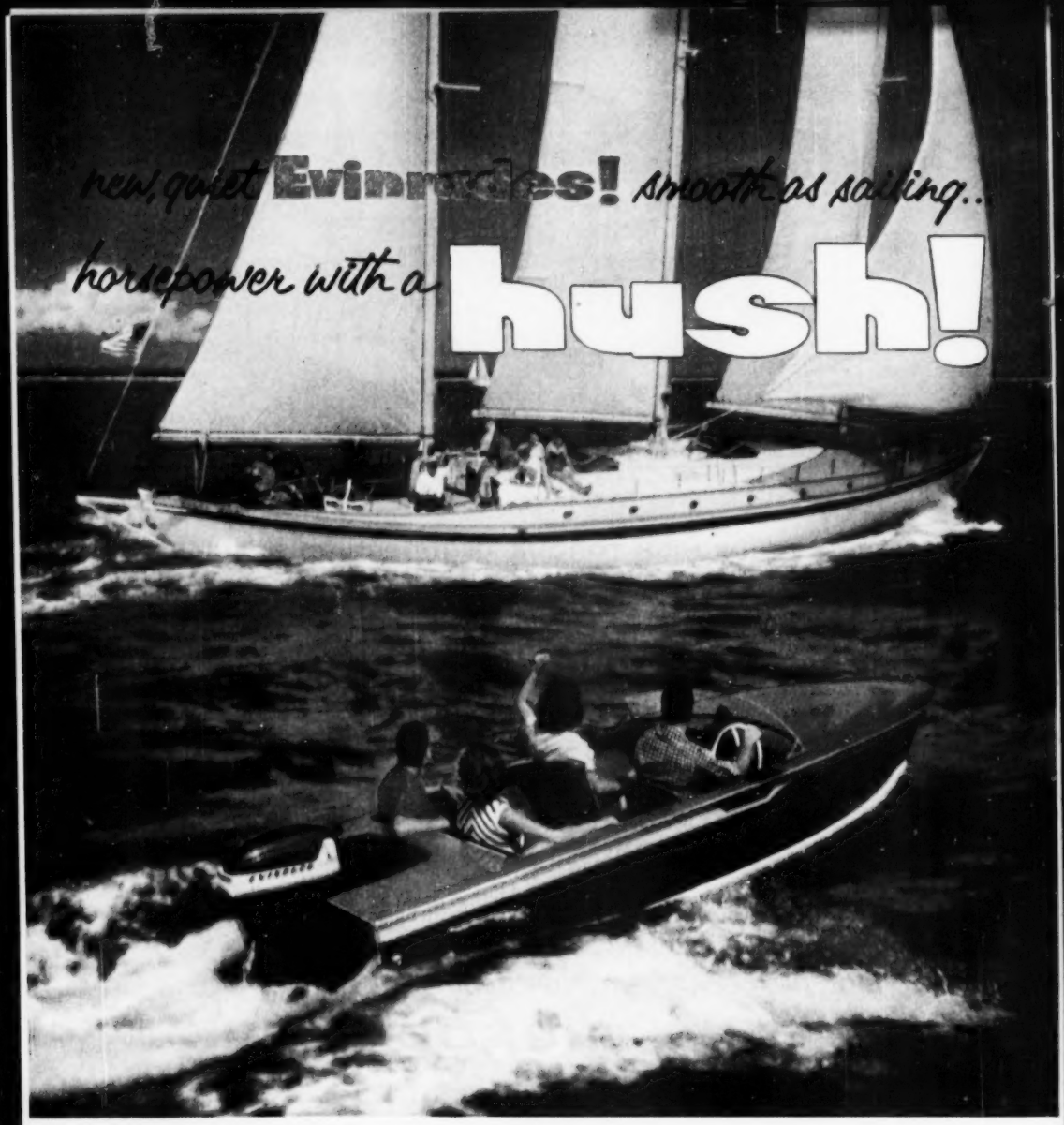

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But *quiet* is not all. You quickly sense that this ride is different from any before. There's a luxurious feeling of utter smoothness. Motor vibration and "boat shake" are magically gone! The wind in your face, the streaming wake, the whisking shoreline, all tell you you're going *fast*. But your ride is smooth as the glide of a sailboat in a kindly breeze.

You will know that here, beyond question, is the *future* in boating fun . . . a new standard of performance that plainly charts outboard development for years to come. But all the wonderful pleasure of it can be yours *right now!*

SEE YOUR EVINRUDE DEALER—look for his name in the yellow pages of your phone book under "Outboard Motors." Choose from a complete range of 1955 models—3, 7½, 15 and 25 horsepower. The 25 HP Big Twin *Aquasonic* is offered in both electric starting and standard models. Prices are no higher than you'd pay for ordinary motors. Time payments available. Your old motor brings top trade-in right now! For free catalog, write **EVINRUDE MOTORS,** *Division of Outboard, Marine & Manufacturing Company,* 4497 North 27th Street, Milwaukee 16, Wisconsin.

In Canada: Mfd. by Evinrude Motors, Peterborough.

Evinrude quiet *Outboard Motors*

Lights that help put the color in color TV almost hide stage in this view of Victor Herbert scene.

How They 'Paint' Color TV Pictures

An artist who uses lights as pigments, a rheostat 'brush,' and an electronic tube as his canvas, will thrill you soon.

By John Lear

WHEN "Rod" Davis got his orders, he shook his head. It wasn't that he was plain contrary. He wasn't looking for an argument. He just knew he was right.

Davis was in charge of lights and cameras for experimental color TV at the National Broadcasting Co., and his orders were explicit:

"Only flat light," they said. "You can have all the color you want in costumes and settings. But use only flat white light."

Davis thought differently. He was confident he could produce some spectacular effects on color TV with colored lights.

It was months ago that Davis began

'Painter' at Keyboard Plays Up the Moon

his campaign of passive resistance to the standing orders. To see how right he was on lighting, watch one of NBC's beautiful color TV shows this fall. It's a product of a new kind of craftsman, the painter in lights.

The lights on TV stages today range through the rainbow's spectrum.

The big backdrop that serves as sky on video is a sheet of fabric, a dull and slightly dirty gray. It is lighted by lamps covered by colored gelatin filters. If the scene is set for a sunny afternoon, the gels are pale blue. For sunset, they are orange and red, for nighttime a deep blue-black.

The key to the light painter's power in color TV is that the enjoyment of color is an emotional—not an intellectual—experience. The light painter sets your mood by the hue he chooses. The villain in a play is fingerprinted for the viewer by trapping him in harsh lamplight. The light painter can even change the character of a hard-boiled harridan by dabbing a blush on her unresponsive cheeks.

Painting with light can give a scene new dimensions. Take, for example, a

LIGHTS MAKE THE SUN SET and the moon rise as Dorothy Warenskjold and Robert Rounseville sing the garret scene from *La Boheme*. Starting with red sky and blue interior (above left), colors were gradually reversed for moonlit ending (above right). Strip of pictures at far left shows some of the roomfuls of machinery needed to achieve these and other effects. Lights are controlled from "organ" (second photo from bottom). Electrician plays its keys to adjust all lights, either singly or in groups, manually or through automatic time control.

THE "STAIN, SHMEAR & SPACKLE DEPT." guarantees true, glarefree color with its assortment of paints and sprays. Everything gets a touch-up —instruments, scenery, faces, even costumes.

setting in Puccini's opera, *La Boheme:*

It was the entrance to a street in Paris. With only a cardboard-and-canvas backdrop, the street looked flat to the eye of the camera.

To widen the space between the sidewalks, the light painters dropped pale blue light down the length of it. Then, at the far end, they cast an orange glow. On color video, the street looked broad and long, reaching right out to the sunset.

CAMERAS—naturally—are a favorite hobby of Rod Davis, whose pioneering lighting techniques pave the way for this fall's big color-TV season. Davis's official title at NBC is Operations Supervisor for Color TV.

Davis's differences with the standing orders on lighting were actually differences with most of the texts on photography. They specified flat white light. It was the accepted method for holding down the contrast range between colors and staying within the latitude of the film.

The possibilities of light as an entertainment prop had fascinated Davis all his life. As a teen-age boy in the little town of Toccoa, Georgia, he and a neighbor lad entertained each other with blinking lights in their darkened bedroom windows. With the long and short flashes of the Morse telegraph code, they carried on conversations over the unsuspecting heads of less ingenious kids.

Since then the audience for Davis's light manipulations has zoomed from one lonely boy to millions of families.

When NBC hired Rod Davis (he was christened Reid, but always has preferred the nickname) soon after he received an electrical-engineering degree from Clemson College, he had never even seen a microphone. But when Graham McNamee rattled off the first sport report that traveled coast-to-coast, Rod got the famous voice onto the air. When a special amplifier was needed for White House broadcasts, Davis made the apparatus. When Radio City was dreamed up, it was Rod who saw that there were plenty of mikes at the cornerstone. Later, when the City needed a master control board, he worked on the installation of the controls.

TV was a natural for Davis because he was a camera nut. He knew he was gone the first time he looked at a video screen in 1937 and saw the *Mauretania* moving down the river into New York harbor. By the time color TV came along, he was boss of 500 engineers doing black-and-white. Friends called him loony for giving up that prestige to undertake an experiment with a staff of only 20 men in 1952. He had studied painting as a boy, however, and he knew something about music. That, plus his knowledge of the camera, made him certain that color TV was *the* medium of future communication and entertainment.

"I have never regretted my decision," he says. "It's the emotional impact that matters in all human affairs, and color stirs the emotions."

The Colonial Theater on upper Broadway in New York City is as good a place as any to see Rod Davis in action. You enter by the stage door on 62nd St., persuade a pleasant policeman inside that you are not subversive, cross a brightly lit tangle of cameras and props and cables, and enter the darkness of a room banked on one side with TV screens. At a desk facing the screens at the right end of the bank, his hair loosely netted by a telephone headpiece, sits Rod.

He is noted for getting his work done without (a) moving very far or (b) saying very much. You can watch him all day and learn practically nothing. Yet, on the other side of the darkened door, out on the stage where the lights are bright

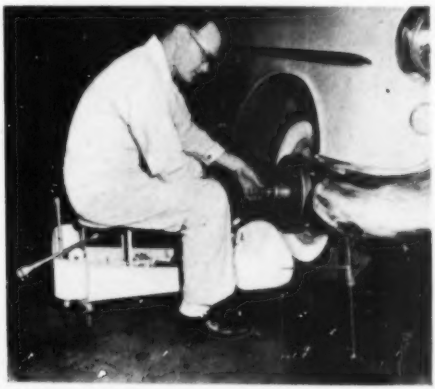
[Continued on page 258]

Movie "Frogmen" Tow 70-Pound Camera Under Water

HERE's how they got the underwater scenes for the movie thriller, "Creature from the Black Lagoon." A 3-D camera run by batteries was enclosed in an aluminum box and compressed air was pumped in to keep out water. An outside switch started the camera. Scotty Welbourne, Universal-International cameraman, devised the outfit.

Sugar Harvested in a Big Way

GIGANTIC motorized hayracks, called Tournahaulers, have replaced the narrow-gauge railway on this Hawaiian sugar plantation. Loaded by crane and powered at both ends by rubber-tired tractors, each totes 30 tons to the mill.



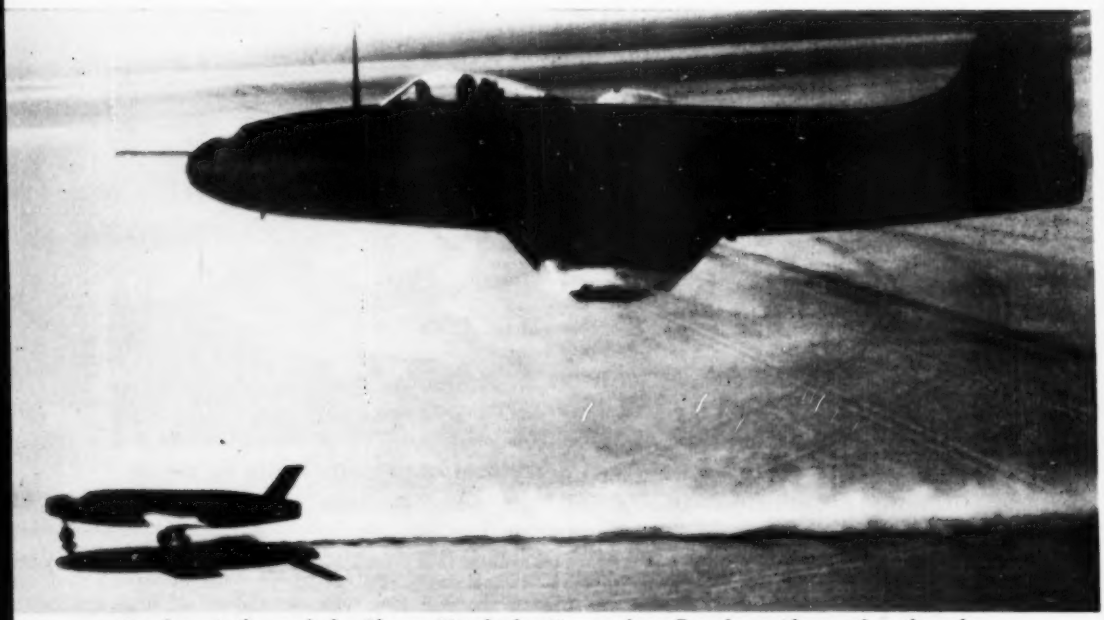
Wheel Mechanic Rolls to Work

A MECHANIC rides up to a jacked-up wheel on this roller-mounted dynamic balancer, made by Bear Mfg. Co., Rock Island, Ill., and starts it with a body-pressure switch. A meter tells him whether he is adding or subtracting weight.

Ryan Firebee, recoverable drone gunnery target, drops from belly of B-26 bomber in mid-air.

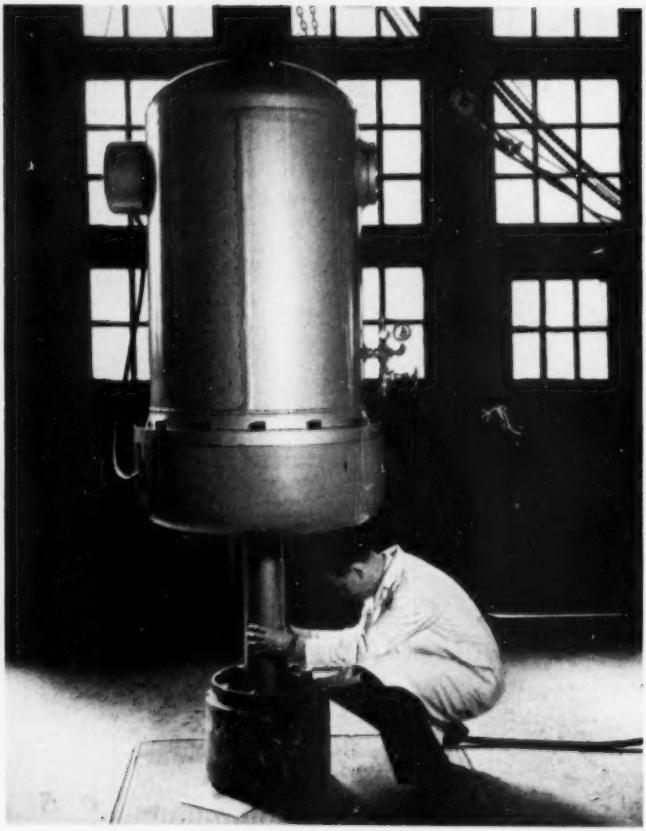
These Jets Leave the Pilot Behind

THE dramatic photos here offer a new peep over the horizon of push-button war: three ways to launch planes without pilots. The planes are all U.S. military jets, one designed for training and two for combat. The one on the opposite page is already on overseas duty, standing guard over the Western front in Germany. Its range is 500-600 miles, its speed about equal to our best jet fighter's.



Regulus missile, made by Chance Vought for Navy, takes off under guidance of mother plane

Martin Matador, a pilotless bomber, is boosted from mobile launching ramp by rocket in tail.



Baby Atom Gun Makes X Rays For Industry

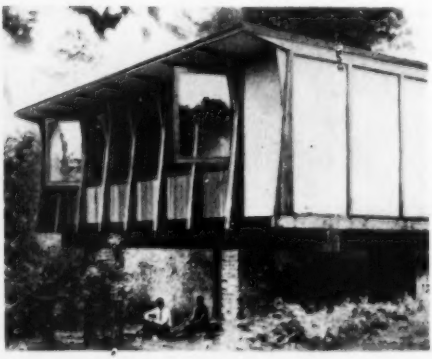
HARDLY bigger than a kitchen refrigerator, this strange tank is an atom-smasher designed for industrial use. It can generate million-volt X rays capable of penetrating steel five inches thick to detect flaws in metals.

Because of its small size and light weight the X-ray generator is easy to move around by truck or crane for on-the-spot X-ray checks. The High Voltage Engineering Corp., of Cambridge, Mass., developed it.

▶▶▶Making airplanes is now the country's biggest manufacturing job, involving 823,000 workers. The auto industry has 786,000 employees.

Kids Learn Optics from Kit

BUILD-IT-YOURSELF kits are moving into the classroom. The students above are putting together a projector and a microscope to learn optics. Models of Industry, Inc., 2100 5th St., Berkeley, Calif., makes this kit and several others.



House Sits Atop Its Terrace

THE terrace is where the basement ought to be in the Lamar Northups' new house in Winston-Salem, N.C. They built their home on seven-foot brick piers, leaving the area underneath the structure open for use as outdoor-living space.

SPECIAL SEALER, applied to scuffed spots of leather, as below, makes them nonabsorbent and helps build a base for new finish. Stirred well before use, it should be allowed to dry completely. Vinyl (imitation leather) does not require use of sealer.

FLEXIBLE FINISH is flowed on like lacquer (middle picture), with full brush and minimum of strokes. Spray gun will also apply it. High-grade lacquer thinner will thin it if necessary, and clean the brushes. Two coats of finish are recommended. When first has dried 30 minutes, very fine sandpaper (bottom picture) smooths sealer-treated spots. Then comes second coat, which should be allowed a full hour to dry.

It is important to clean upholstery before renewing it.

New Upholstery Is Painted On

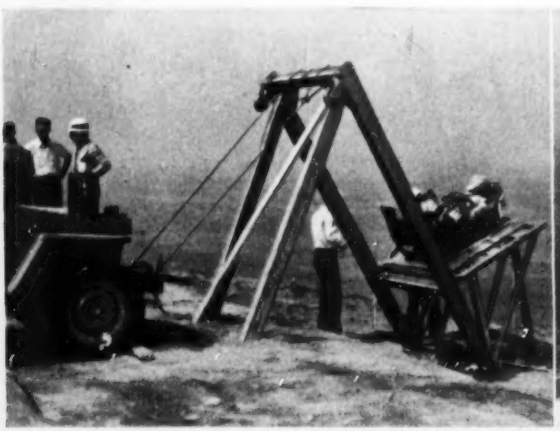
IS THE leather upholstery faded and worn in your sports car or convertible? You can make it look like new—and any color you like—with a paintbrush and a flexible, noncracking finish called RamCote*, now available at some paint stores. The finish comes in two types: for real leather, and for plastic imitation leather, used in most late-model foreign cars.

AND HERE'S THE RESULT. Finishes come in some 10 colors; mixing gives more.

*Sold by Wayne Products Co., 2737 Hawthorne St., Franklin Park, Ill.

Four Fighter Generations Fly Together at Gunnery Meet

ONCE it was a hot airplane, but a 110-m.p.h. Spad from World War I (above, lower left), just seemed to be standing still when an F-51 (World War II) and two modern jets zoomed over it recently. This "cavalcade of fighters" was a part of the ceremonies at a recent Air Force all-jet gunnery competition in Nevada.



Dummy Shot Off Cliff to Test Ejection Seat for Vertiplane

TESTS on a Pacific cliff proved the worth of a new ejection seat designed for Navy vertiplanes—fighters that take off straight up. The seat and dummy were set atop the cliff in the vertiplane's landing or take-off position (above left). After firing (above right), a rope separated the seat from the dummy pilot and the chute opened.

Radar Fighter Finds the Target Through Night and Snow

THE deadly eye of radar is vividly demonstrated in this unusual photo. The plane is a radar-equipped Venom night fighter of the Royal Swedish Air Force. Its mission was to find an "enemy" bomber in a night snowstorm. Radar guided the fighter straight to its target, from which a waiting cameraman snapped its unerring approach.

Jet Is Reversed to Stop Plane

THESE vanes in a jet tailpipe make the blast turn around and blow forward, providing an effective brake for landings. The reversed jet comes out as two separate streams under the tail. National Advisory Committee for Aeronautics devised it.

Helicopter Lifts Jeep in Sling

THE Work Horse lived up to its name at a recent Air Force demonstration at Dayton, Ohio, picking up a 2,200-pound jeep in its external sling with no apparent effort. The tandem-rotor H-21 is manufactured by the Piasecki Helicopter Corp.

The Gas Turbine: Car of the Future?

Detroit races Europe to perfect "jet" engines. Here a reporter describes the sensational results and tells you just what it's like to drive a turbocar.

By Harland Manchester

AT THE gala opening of the Chrysler Proving Grounds in Chelsea, Mich., last June, an ordinary-looking Plymouth stock car stole the show. Spurting around the track with jack-rabbit agility, it pulled up before the reviewing stand emitting a soft, high-pitched "whir" instead of the usual muted "chug." It was powered by Chrysler's celebrated gas turbine, latest entry in the motor manufacturers' inventing race which many people believe will revolutionize tomorrow's automobile.

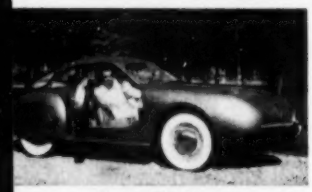
Young brother of the jet which is rapidly chasing piston engines from the skies, this still coltish engine is stirring up wild hopes and violent arguments wherever cars are made. It is the biggest long-range "if" in Detroit, where Chrysler, Ford and General Motors are eyeing one another like hawks and spending millions in gas-turbine research. On the West Coast, Boeing has a turbine-powered truck on the road. In Europe, five turbine-driven cars have shown their paces.

This sensational engine, with about a fifth as many moving parts as the conventional piston engine, solves problems the automobile industry has been wrestling with for half a century. It uses no water—thus eliminates the bulky and expensive radiator and cooling system, with attendant cold-weather troubles. Octanes mean nothing to it—it will burn anything from aviation gasoline to household heater oil. The turbine has no ignition system except one spark plug, used only for starting. It starts easily in winter, and there is no warm-up period. It cannot stall. It has a built-in automatic transmission, so there is no clutch or gearshift. Only the gas pedal, brake and reverse are essential. Since fewer surfaces rub against one another, it uses only about one-fifth of the oil the piston engine needs. It weighs less than half

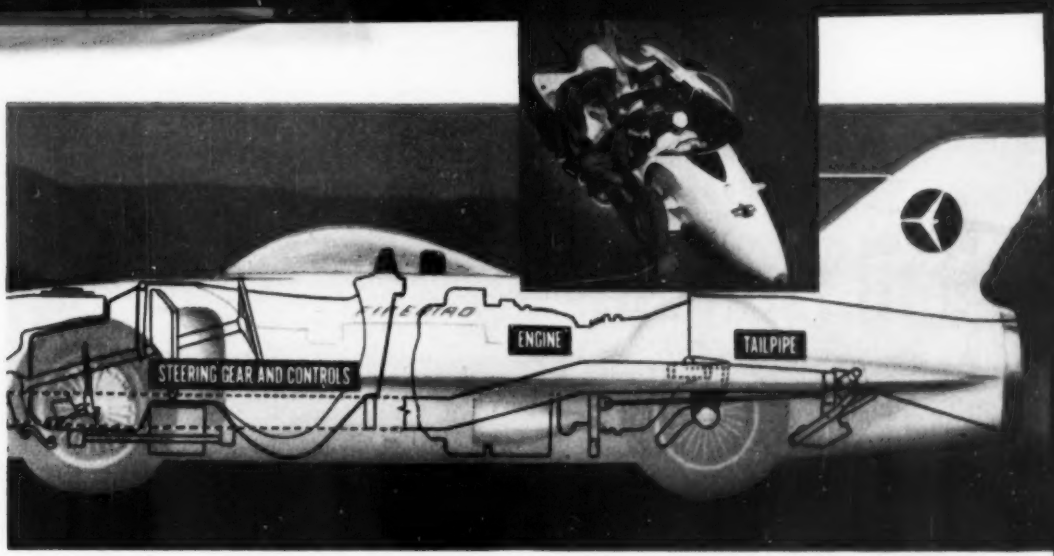
Today's Turbocars

Britain's Rover

Chrysler's Plymouth



France's Socema



Engine and enormous exhaust vent occupy almost half of GM's experimental Firebird, shown in the inset at top winding up for a trial run.

as much, and engineers expect to sweat it down still more.

In Birmingham, England, I rode in a turbine-powered car made by the Rover Co., makers of a popular conventional automobile. Rover built the world's first "turbocar" four years ago, (PSM, June '50, p. 98) and aroused interest by driving it on a Belgian highway at 151.2 miles an hour. This second model rides as though it had no engine at all, but is smoothly propelled by ghostly forces. This is because its moving parts rotate and there is no vibration, caused in today's engine by the back-and-forth motion of the pistons.

Beautifully simple in principle, the automotive turbine is built like an aircraft jet engine—up to a point. In both types, a whirling rotary compressor pulls in air, squeezes it into small volume and pipes it into a combustion chamber where it fans a kerosene fire, creating a tornado of blowtorch intensity. The expanding gases give up a part of their power on their way out to drive a bladed turbine which is fixed on the same shaft with the compressor, thus constantly compressing the air which fans its fire. In the jet plane at that point, the gases escape through a nozzle and push the plane ahead. That would not do for a road vehicle because of the backward blast. So in the gas turbine the gases jump a "fluid drive" gap and expend the rest of their power driving a second turbine, just as the wind rotates a pinwheel. This "pinwheel" is geared down to drive the wheels of the car.

Cooler exhaust of the Chrysler turbine results from extracting some of its heat to warm up the fuel coming in.

Despite the simplicity and incredibly smooth performance of this engine, Rover engineers point out that many problems must be solved before the turbocar is placed on the

market. Put your hand behind the exhaust and you feel a torrid gale that would be intolerable in traffic. The turbine pulls in a great deal more air for combustion than a piston engine does, and so it has more exhaust gas to get rid of. Rover's car gets no more than eight or 10 miles to a gallon of fuel because it throws away so much heat through the big exhaust vents. A vertical exhaust is being designed to end the road nuisance, but fuel consumption is still a problem.

Big Turbine Runs Bus

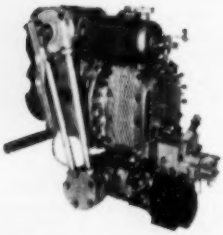
Husky Whirlfire engine, developing over 300 horsepower, accelerates experimental GM bus from 0 to 60 miles per hour in 42 seconds.

When you step on the gas to go faster, there is a brief time lag before the car spurts ahead. That is because of the free-wheeling power turbine, which drives the wheels but is not mechanically connected with the part of the engine in front of it. It takes it a little time to rev up when the force of the "tornado" increases. This means that in the turbocar's present state the driver must anticipate the need for more speed.

Rover men believe that these technical problems can be solved but they won't guess when. Meanwhile they have built a factory to manufacture turbine power plants for use on fire-fighting equipment, etc. The fact that these engines weigh only 116 pounds compared with 700 for a comparable piston engine, is another indication of their potential future.

In a workshop near Le Bourget Airport, Paris, I saw a turbine-powered truck built by the Socema firm, now specializing in turbine motors. Engineer Pierre Agneau told me that a 300-horsepower turbine motor can be built to weigh 330 pounds, while a diesel motor of the same power weighs 3,307 pounds. Two years ago Socema turned out a turbocar sedan which did 100 miles an hour. Both vehicles are heavy fuel users, but research is continuing.

Little Turbine Runs Pump



Hand-cranked Rover 60-hp. turbine, on sale in Britain, weighs 116 pounds. Driving a 100-pound pump, it does the work of a one-ton gasoline pumper.

At the plant of the Fiat Motor Co. at Turin, Italy, I saw a sporty coupe with a 200-horsepower turbine mounted in the rear. First tested last May, this car circled the track at 155 miles an hour. Dante Giacosa, its designer, stresses the fact that it is a prototype, and that a lot of work must be done to put such a car in production.

"The hardest thing to do with this engine," he said, "is to put it in a passenger car, so we are attacking the toughest job first. Like the other companies, we'll go on spending money on research and gradually solving problems. As the first result of this research, the gas turbine will probably be used in trains and ships. Trucks will probably be the first road vehicles to use it. Sometime we may arrive at a turbine-driven passenger car." [*Continued on page 260*]

Builder Designs Out Upkeep

Howard Natter won't have to paint, mop dark corners, wash walls or fuss with storm sash.

By Devon Francis

ONCE upon a time a fellow named Howard Natter decided that the worst thing about owning a house was having to paint the outside every three or four years. It took time. It was hard work. It was messy. He vowed that if ever he owned a house, he would fix it so he wouldn't have chores like that.

He would fix it—he told himself—so he wouldn't have to paint any interior walls, either. Or replace loose tiles in the bathroom. Or scrub grease and grime off the ceiling and walls of the kitchen. Or put on screens and take down storm windows.

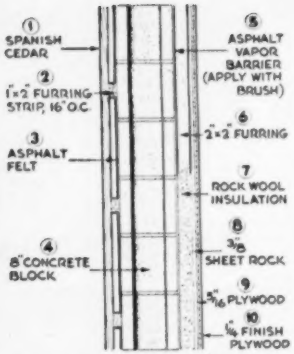
In short, his house would require practically no maintenance.

When he told home-owning friends what he was going to do some day, they laughed.

Well, that was a dozen years ago. Howard Natter now owns a house. It's about four-fifths finished. Everything

HOMEMADE TILES of plastic linoleum on the kitchen ceiling reduce cleaning problem to mopping. Here a model shows how easy it is.

RADIANT BASEBOARDS are outset 14 inches from wall on two sides of living room—27 feet long—so Natter can "build in" bookcases, cabinets and shelves. Here he fits piece of Honduras mahogany into space. For entertainment while he works, he scrounged record player in foreground at junk yard.



OUTSIDE WALLS are built to cut down escape of heat in winter, reject sun's heat in summer. L-shaped, house measures 63 by 43 feet. Living room is 16 feet wide—maximum width that joists could support. This does away with lally columns.

that he vowed he would do, he has done —and more. He won't have to paint. He won't replace tiles. He won't scrub the kitchen. He will never have to bother with screens and storm sash.

He also won't have to snake mops around dark corners or under the furniture. He has no dark corners, and all the furniture will be light enough to move with one hand. He won't have to refinish hardwood floors. His original finish will last for years.

He won't have to dust such things as bedroom chests and living-room sideboards. They are all built into the walls.

Natter is well-nigh the perfect personality for the job. He has bounce and enthusiasm. He is inquisitive. He experiments.

GLUING MACHINE, used to bond wood paneling to inner-wall sheathing diathermically, is home-built. Glue sets in seven seconds. Before stumbling across this kind of gluing, Natter had built his own veneer press for working on such items as drawers and doors.

Lightning Coincidence

He was no more than 12 when he built a mirror oscillograph. It worked. Shortly afterward he built an arc lamp. That almost worked. He plugged it into a wall socket at his parents' home during the height of an electrical storm. At that moment lightning struck the generating station serving that section of New York City. All the lights for blocks around went out.

An hour and a half later, when they finally located young Howard Natter under the bed, he had about decided to run away from home rather than face the consequences for blowing all the fuses in the West Bronx.

Practically everything from the foundation on up to the ridgepole in Natter's house, built on a quiet, handsome street in Tuckahoe, N. Y., is his own handi-

work. He mixed his own concrete and poured his own footings. He milled every inch of his own lumber. With a pick and shovel he dug out more than 1,200 cubic feet of hardpan for a nine-foot-deep ditch to bring in his plumbing.

The house was a product of no caprice. Until Natter grew up and left home, he and his family always lived in apartments. Even in his teens he was drawing plans for a house. In every plan was space for a home workshop.

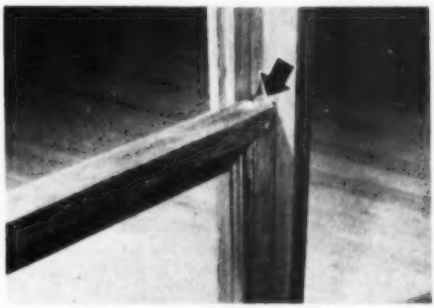
Paints, Plastics and Elbow Grease

Natter is now working toward a doctoral degree in education at New York University. It is a happy circumstance that to fulfill the requirements for it, he has had to do research on house building. Some aspects of this that he has tackled had never been studied before. It took him 18 months, for instance, to find a wood siding that would not require paint. It took him a lot less time to discover that plastic linoleum, hand-cut into tiles and glued to the kitchen ceiling and walls, automatically solved the problem of cleaning. A soaped mop removes grease and dirt in four minutes flat.

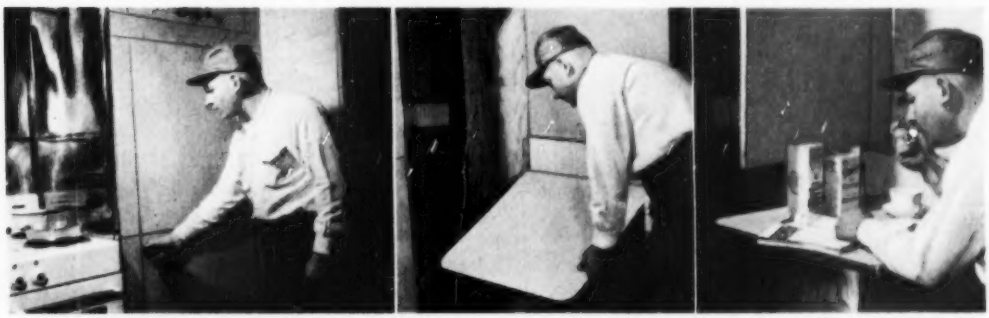
Experimenting, Natter substituted for the customary bathroom tile a hard plastic laminate normally used for counter tops. It is easily applied, waterproof and, above all, durable. Tiles work loose. This stuff won't. He used the same laminate on his kitchen-cabinet doors.

The top half of his bathroom walls

DRAPES NEST in L-shaped recess when drawn to keep them from covering ends of picture windows. Permanent screens on ventilation windows (right) will be hinged at the side to give easy access to glass for cleaning.



EXPERIMENTAL WINDOW convinced Natter he could avoid storm sash. Double-glazed on his own design, it has wood slide (arrow) under spring compression as weather seal. Making it himself saved $1,100 on double-glazing alone.



DOOR TO STORAGE CLOSET in kitchen is more than that. His own efficiency expert, Natter built a Dutch door there. At mealtime, as picture sequence shows, he opens lower half of door and from back of it pulls up a collapsible table with snap-lock hinges. This is his dining table. (He reads while he eats.) A hook keeps door and table from swinging.

KITCHEN CORNER has three handy diagonal drawers. Cabinet doors are of plastic laminate —waterproof, durable and easily cleaned. To save space, kitchen radiators are set in floor.

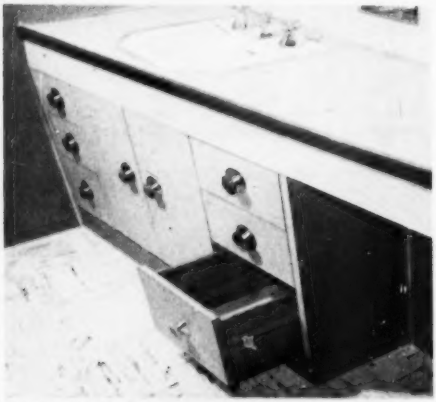
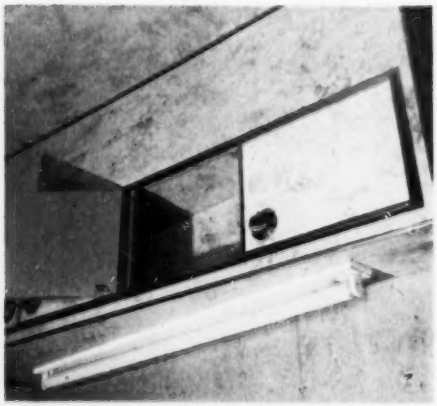


TABLE ENCLOSING WASHBASIN in master bath is compound-beveled toward floor and entrance for more foot and elbow room. There are no under-furniture openings to collect dirt.



SPACE UNDER CEILING in bathroom, normally wasted, gives Natter extra storage areas. Cabinets are covered and lined with plastic linoleum, same stuff he uses in kitchen.

and the ceiling are covered with easily cleaned linoleum. The floors are linoleum plastic tile over a base of concrete so that spilled water won't seep through and rot his subflooring and joists.

To save room in the kitchen, Natter put his radiators in the floor. Ordinary practice in such construction is to embed pipes in a concrete slab for radiant heating. Natter figured he would have costly maintenance trouble if a pipe leaked. So over his subfloor, he laid down plywood grooved to take his heating pipes, topped it with sheets of asbestos cement screwed to the plywood, and topped *that* with linoleum.

If a pipe leaks, he just pulls up the linoleum and unscrews the plywood.

Maintenance on the three toilets in the house will be at a minimum over the years because Natter has no tanks and float valves. He fed inch-diameter pipe into the house in place of the usual half-inch, to get adequate water under 40 pounds' pressure for direct flushing.

By building walls almost a foot thick to reduce heating bills, Natter obtained a useful by-product—deep-set frames for his picture windows that give him recesses for his drapes.

Wipe-Down Walls Ease Maintenance

When the inside wall surfaces are finished, they should need no more attention, aside from an occasional wiping down, for the life of the house. Every wall will be wood-paneled and covered with a varnish that dries dust-free in 20 minutes and looks hand-rubbed.

The finished wood flooring will be treated with a tung-oil preparation that, Natter says, will reject scuffing and maintain its appearance for years.

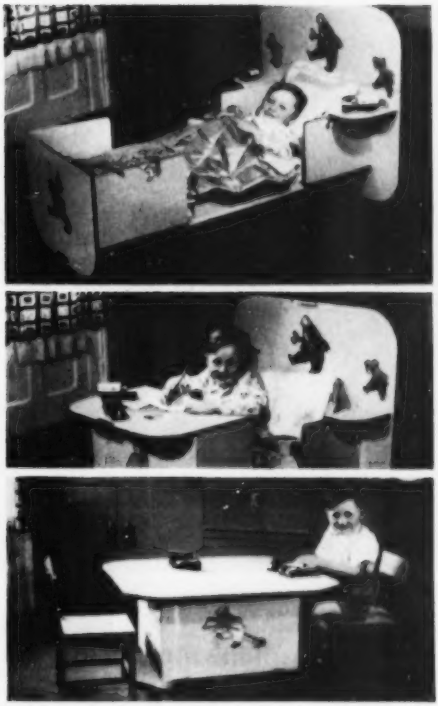
Ceilings will not be painted. They will be covered with an acoustical tile, cemented on sheet rock and finished with a spray plastic that can be kept spotless with a vacuum cleaner.

Natter even chose his colors for durability to the eye. Annoying colors might cause replacement-maintenance. So, in the kitchen, he used neutral, lightly mar-

[*Continued on page 262*]

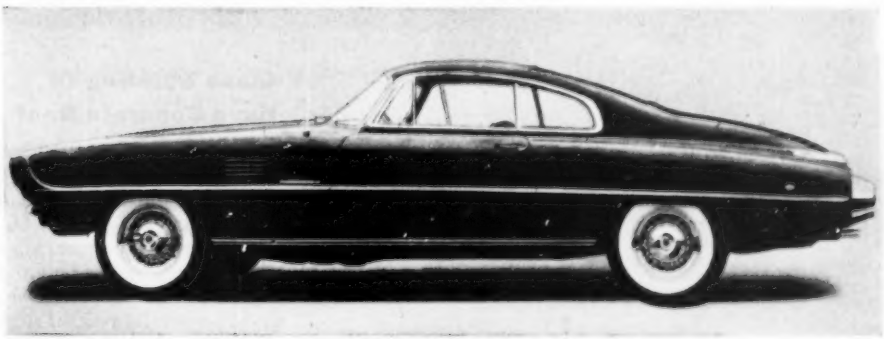
Floating Suit Bars Out Cold

THE Army Engineers are testing a new floating suit (above) that can support a soldier burdened with 40 pounds of combat gear. Called coldbar clothing, it will keep GIs cozy in frigid climates and during short periods of immersion in icy water.



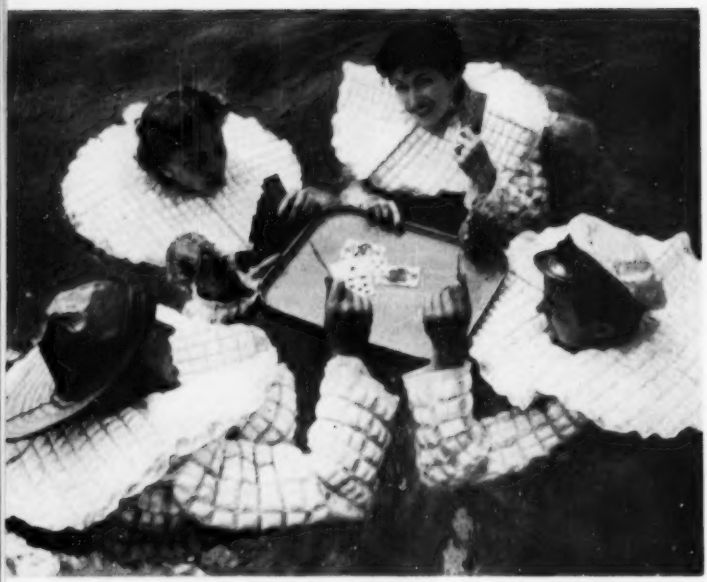
Nursery Bed Does Triple Duty

DESIGNED for small apartments, a new piece of nursery furniture converts from a full-length bed into a desk with bench or a good-sized table. Peeter Reeter Productions Ltd., 22-24 Barbourne Road, Worcester, England, is the maker.



This Rakish "Idea Car" Makes Like a Jet Job in the Dark

THIS is the Adventurer II—214¼ inches of show car on a standard DeSoto 125½-inch wheelbase chassis. Like its smaller predecessor, it was hand-crafted by Ghia of Turin, Italy. Jet-like "after-burner" cones housing the tail lights give the effect of blazing jet exhausts at night, but a 170-hp. Fire Dome V-8 is what provides power.



Life Jackets Float Players for Cool Game

A GERMAN photographer cooked up this picture to show off a new kind of life jacket which is being manufactured in his country. The garment, with its big collar, blows up from a folded size small enough to fit in your pocket.

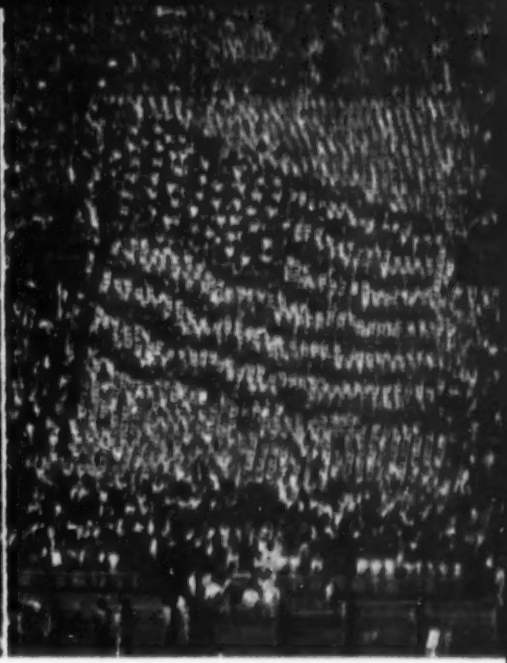
▶▶▶A lot of South Carolina farmers still work their fields with mules. The state counts 124,000 of the stubborn critters, each worth about $125.

Fast-Working Spray Chokes Airplane Fire

A TONGUE-TWISTING spray —chlorobromomethane— put out the make-believe airplane fire at right in 33 seconds. A dummy plane doused with 150 gallons of gas and oil provided the blaze. The General Fire Appliance Co., London, says the RAF and USAF are fitting fire-fighting vehicles with "C.B." tanks.

Glass Building to Have Concrete Roof

A GLASS-WALLED building will house the Illinois Institute of Technology's school of architecture in Chicago. Using a model, designer Mies van der Rohe shows how the concrete roof will hang from girders atop the welded-steel frame, leaving a column-free main hall. A foundation rising five feet above ground and faced with translucent glass will let light and air into basement rooms.



Card Tricks Thrill Football Crowds

Huge cheering-section pictures at U.S.C. games involve 2,000 students, 700 man-hours' work.

HISTORY of a highly special sort was made one balmy Saturday afternoon 32 years ago this fall when a cheering section of 200 students at a football game between the Universities of Southern California and Nevada suddenly raised golden cards that spelled out "T-R-O-J-A-N."

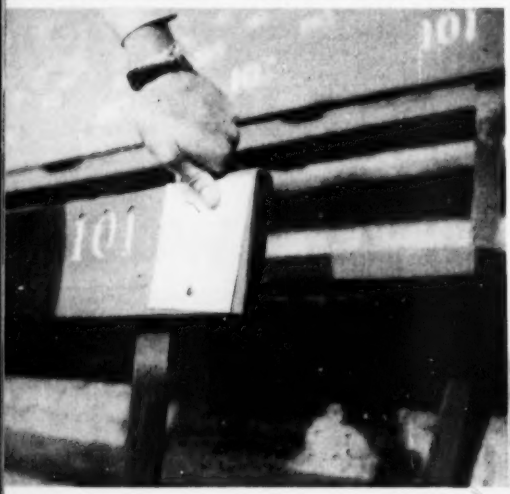
A U.S.C. man named Lindley Bothwell thought up the stunt. Down the years, the idea, in scores of U.S. stadiums, has grown steadily more spectacular.

At U.S.C., for example, the typical razzle-dazzle between the halves now consists of 12 live "canvases," which involve 2,000 students and require 700

A PAINTING IS PLANNED on graph paper, marked off in the same number of squares as there are seats in the stadium's cheering section.

THREE HOURS BEFORE THE GAME, members of student honor societies distribute stacks of colored cards to each seat within the "frame."

THE ORDER OF THE DAY, a list of the pictures to be formed and the color to be raised for each, is tacked to every seat in the section.



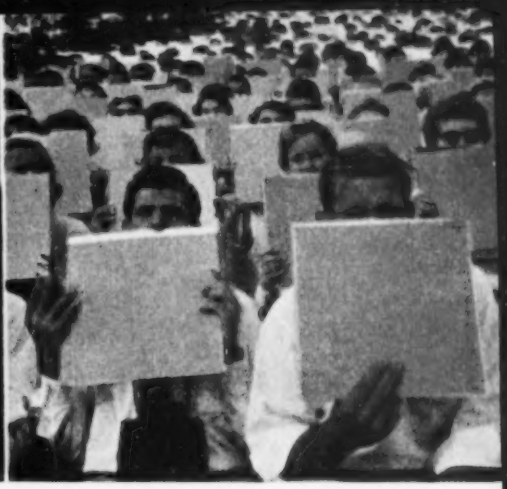
"GET READY FOR STUNT NO. 31" shouts a cheer leader, preparing to tell 1,800 students when to bend down, select a color and display it.

man-hours of work for the three or four minutes it takes to run off each show.

Card paintings such as those you see in the accompanying photos are 50 rows deep, 36 seats wide. That accounts for 1,800 students. The remaining 200 members of the big show's cast are those who prepare and approve the designs, fasten printed instructions to the backs of the seats in the cheering section and distribute stacks of colored cards, four to each seat. The cards are 11 by 14 inches in size, with a different color on each side. The usual colors used are brown, black, red, green, silver, white, gold and blue. Some cards have a metallic covering, which glitters when wiggled.

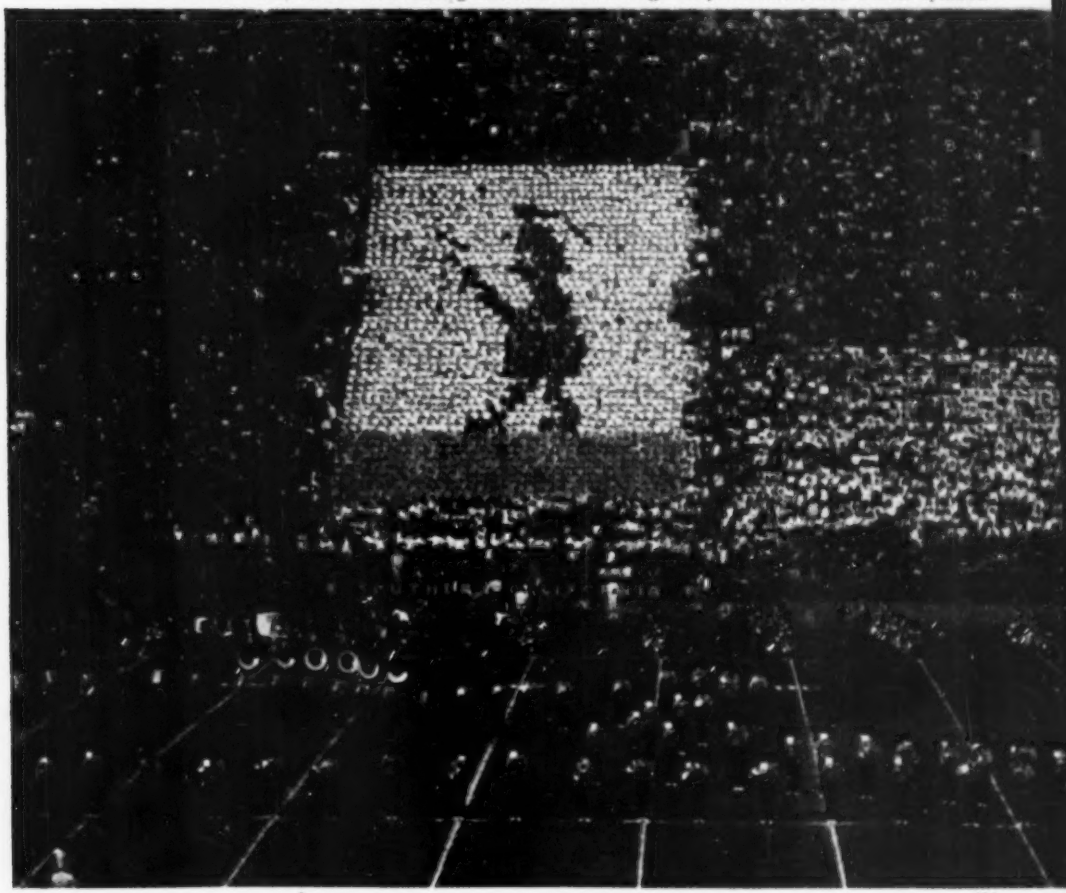
Card holders bend forward between pictures and select the proper color for the following display. Then, at a command shouted into a microphone, they lean back and hold the colored cards in front of their faces, while the crowd roars. —*Andrew R. Boone.*

WHAT'S COMING NEXT is shown to the students in the cheering section before each successive picture. Each "stunt" lasts only seconds.



CLOSE-UP OF A "CANVAS" while it is being displayed is, as with all paintings, disillusioning. It looks a lot better from a distance.

As thousands cheer, 1,800 card-bearing students form a huge Trojan warrior, the U.S.C. symbol.

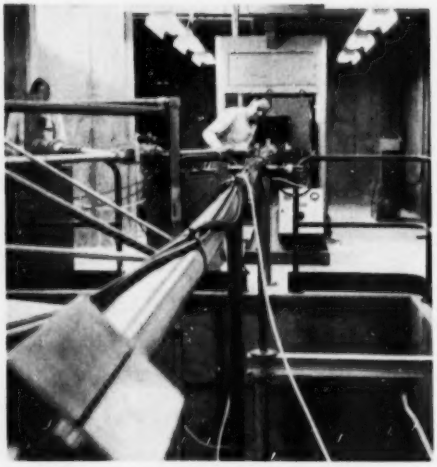


Clay Jar Holds Baby Mummy 3,000 Years Old

BACK in the days of King Solomon, the skeleton at left was buried in the clay jar that still partly surrounds it. But the mouth of the jar was far too small to admit the head of the mummy. How was it fitted into the burial urn?

Dr. Joseph Free of Wheaton College, who found the jar at Dothan, 60 miles north of Jerusalem, believes the clay was molded around the body of the child.

The level at which the jar was excavated indicates that it dates back to the period between 1,000 and 800 B.C.



Long Tube Speeds Atom Bullets

PIECES of atoms race down this tube 40,000 times faster than the fastest jet plane. It is a new Van de Graaff accelerator installed at the Hanford plutonium plant to create precise beams of neutrons—atomic particles—for holding tests.

Giant Tanker Does 17½ Knots

THE world's most powerful tanker, the W. Alton Jones (above), can haul 14,112,000 gallons of gasoline—a year's supply for 20,000 cars—at 17½ knots. A crew of 54 has air-conditioned staterooms aboard the 38,000-ton Cities Service ship.

Weird New 'Rhino' Can Go Anywhere

Inventor Aghnides

On bubble wheels that adjust their grip to water, sand, swamp, snow or pavement, this dreamboat-come-true just keeps on rolling.

WHEN Elie Aghnides was a young man he arrived at the conclusion that he was never going to get anywhere working for somebody else. So, quite dispassionately, he decided to become an inventor. He invented things that made him a lot of money.

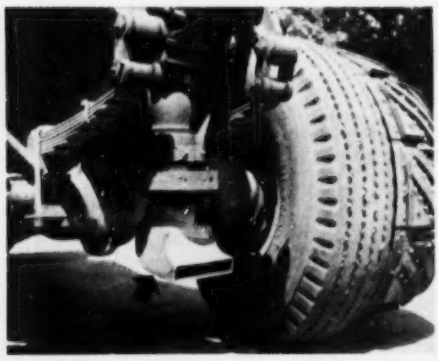
Now, able to dream as he pleases, he has invented a vehicle that is like nothing else on the face of the earth. Called

ON HARD TERRAIN only the zigzag strip of rubber around the Rhino's wheels touches the roadway. As they sink into soft footing, more and more of their ribbed surface takes hold.

LOW CENTER OF GRAVITY lets Rhino list 75 degrees without toppling over. Five-ton vehicle is 19 ft. long, 9½ ft. wide, 9 ft. 10 in. high. Body is aluminum welded to steel frame.

the Rhino, it can travel on pavement, dirt, sand, mud, in swamps and even in water. It can be axle-propelled or jet-propelled, or both. It rides on what vaguely resemble wheels.

There's only one Rhino so far. It took the Marmon-Herrington Co. of Indianapolis five years to build it under the inventor's direction. Soon Aghnides is going to invite the armed services to look at it in Washington.



RECTANGULAR NOZZLE (arrow) helps wheels propel Rhino over lakes and rivers by spewing out a jet of water. Nozzle pivots for steering, reverses to flush vehicle off sandbars.

The Rhino can do 45 miles an hour on the open highway, even with a modest 110-horsepower engine. It practically refuses to overturn on steep slopes. Its five tons ride buoyantly through mushlike mud.

Track-laying vehicles, like Army tanks with caterpillar treads, always present the same amount of surface contact regardless of the footing. The Rhino has a variable surface contact. Its "wheels" are hollow hemispheroids tilted outward from the body at their tops. The deeper the Rhino sinks into anything, the bigger the bearing surface it presents—the hemispheroids simply splay out farther and farther into contact with whatever it is they're in, and presently their resistance and gravity are in balance.

For varying terrain, the weird vehicle can use any of four forward speeds and two-wheel or four-wheel drive. It can also be shifted to four-wheel, no-spin drive for maximum traction in deep sand or mud. At its recommended cruising speed of 25 miles an hour on good roads, the inventor claims, it gets 12 miles to the gallon.

In rivers or lakes the Rhino is both propelled and steered by a gush of water pumped out a tube at the rear. It floats because not only the hemispheroids but the body itself are watertight.

Aghnides, a naturalized Greek-born citizen of the U. S., invented the Rhino because he figured that no vehicle existed that could be used to help defend the continent in the great roadless wastes of Alaska and Canada.

The Rhino is only a spare-time project with Aghnides. His first love is a water aerator for home faucets. Millions of them have been bought by American housewives. They remove chlorine, add air, and make soap lather quicker, says the inventor, and also make water more palatable.

Aghnides is a wiry, handsome man of 49 who sometimes is mistaken for the operatic star Ezio Pinza. He lives in a luxurious apartment in New York where the custom-made ash trays are shaped like hemispheroids. END

ON FOUR-WHEEL DRIVE the Rhino claws through sand, climbs 65-percent grades. Aluminum front wheels, twice as big as the rear, are six feet in diameter and weigh 1,500 pounds each.

HOLLOW WHEELS and seam-welded body keep Rhino afloat. It makes five m.p.h. in water, up to 45 on concrete with 110-hp. engine that inventor plans to replace with more powerful one.

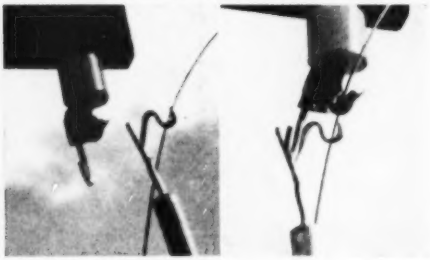
Phone Wires Put Up Without Climbing Pole

Fittings are attached to crossarm on ground . . .

. . . then pole, trailing guy wires, is set up.

Tool on long rod slips the wire into clamp . . .

. . . and locks it in with a turn of the screw.



A NEW, fast way of stringing wires on poles is speeding the installation of telephones in rural areas. The heart of the system is a clamp on the crossarm into which wires can be inserted and locked without climbing the pole.

A second important part is a new kind of insulator. Unlike the familiar glass insulator, mounted on top of the crossarm, the new one swings underneath or is suspended from a bracket on top. Used in combination with the clamp, it permits wire-stringing from the ground. A crew of only three or four can do the job.

High-School Classes Teach Gun Safety to Young Hunters

To CUT down shooting accidents during the hunting season, New Hampshire schools are giving courses on how to handle firearms safely. At right above, a field instructor explains the parts of a rifle while Dover High School students hold their pieces with the actions open. The teen-agers learn how to check a shotgun or rifle to be sure it is in condition for shooting, and how to carry firearms when walking in line or abreast (above) without endangering the lives of companions. At right, a young huntress passes her gun to a pal under the eye of James Dee, Western-Winchester expert, before making her way over a wall.

Fan Screws into Light Socket

THIS little electric fan screws into any desk lamp or overhead chandelier in place of the light bulb. The tiny blades spin at 2,000 r.p.m., moving 247 cubic feet of air a minute. Schoeller & Co., 115 Moerfelder Landstrasse, Frankfort on the Main, Germany, is the maker.

The inside dope from Detroit on changes in the works for 1955

What's Coming In Cars

BUICK will underscore what seems to be a permanent trend—more horsepower. Coming also: an improved transmission and tubeless tires.

CADILLAC will boost engine displacement for more power. Styling changes will be few, conservative.

CHEVROLET will introduce a spanking and powerful new V-8 overhead-valve engine and a new six. Chevvy's silhouette will look lower. Additions: new bodies with wrap-around windshields.

CHRYSLER along with the other Chrysler Corp. cars will undergo complete restyling. The Chrysler, Dodge, DeSoto and Plymouth (see below) will be the most changed group of cars in Detroit, with lower silhouettes, wrap-around windshields.

DODGE will bring out "something new in driving controls" in the biggest, most powerful Dodge ever built.

FORD will boost its horsepower spectacularly in its fight with Chevrolet for first place in sales. Both engine and body will be new. The car will look longer, lower. An addition: a wrap-around windshield.

LINCOLN will have its own, home-grown automatic transmission, of the torque-converter type, to replace its GM-made Hydra-Matic. Power will be up. Optional: tubeless tires.

MERCURY ought to be way up in performance, with a new engine and a lot more horsepower. The car will be new from bumper to bumper. A line of four-seaters will be introduced.

NASH gossip continues to revolve around the probability of a V-8 engine in the big Ambassador. Front wheels—surprise!—will be at last exposed. Turning radius will be shorter. Addition: a wrap-around windshield.

OLDSMOBILE will make greater use of the two-tone body introduced this year. Power will be up.

PACKARD has an ace up its sleeve—an exclusive that has to do with ride. That new V-8 will make its debut. So will a new, lower body and an improved automatic transmission.

PLYMOUTH promises to astonish its friends with fresh styling by the man who gave the Studebaker that continental look. And under the hood you will find a V-8 with hemispherical combustion chambers like those in the rest of the Chrysler Corp. line. With a lower silhouette, the '55 Plymouth has been engineered and styled to make the Ford-Chevrolet fight a triangle. Additions: new suspension, new steering.

PONTIAC at long last is getting a V-8, plus a complete styling revision, a new suspension and new steering. Tubeless tires will be optional.

STUDEBAKER will establish a new series of cars with surprising horsepower. The economical Champion will be up in power, too.

Plans for the 1955 Hudson, Kaiser, Willys, Henry J and Nash Rambler were still vague at press time.—*Devon Francis.*

BUTTON atop selector lever keeps it from over-traveling. Wheel can be adjusted by loosening fluted collar on steering column. There's 60.2 inches of hip room, more than in '54 Ford sedan.

Here's your chance to take the wheel of

Ford's New Sports Car

The Thunderbird has luxury to spare, but its big new engine gives flashing performance, too, says the first driving report.

By Frank Rowsome Jr.

THE word on the new Ford Thunderbird is that it is a real bucket: able, good-looking and, if you wish, sinfully luxurious. This is the high-performance car that Ford partly unveiled last March, and that will be formally announced this month.

The Bird moves more rapidly than you will generally find it advisable to conduct it; it foots creditably around turns that would carry most U. S. cars into a cornfield; and it provides such amenities, conspicuously lacking in its transatlantic sports sisters, as real weather protection, considerable luggage space, and non-contorted entrance and exit—

COMING AROUND on gravel, Thunderbird keeps its footing or slides precisely at your command.

NO NEED to limit yourself to a nylon shirt if you want to tour in the Bird. The madam may miss a sedan's cavernous compartment, but this is space to burn by sports-car standards. Center gas cap is accessible through a flap in the lid. Mark well the characteristic rear-quarter shape: you'll see it often in 1955.

eliminating the need for gymnastics.

Certain points should be ticked off on the other side. It won't be cheap—the guesses hit around $3,200, depending on options.

It isn't designed for the man who has a houseful of kids—it will seat three, but the poor sod who draws the short straw should have legs to match. And finally, it has characteristics that will distress sports-car cultists: a hefty 3,147-pound curb weight, a scarcely cat-quick 20-to-1 steering ratio, and plenty of such optional concessions for the ladies as an automatic gearbox, power steering and power brakes.

Ford engineers know that these aspects of the Bird will inflame die-hard sports-

NEW 292-INCHER fills up the engine room. Under my left hand is the big shroud that helps the fan draw air through the special radiator. Air scoop in front-hinged hood is no dummy, now that Ford has given it an effective rain trap. The idea is to feed the four-barrel carburetor cooler air than that under the hood. Cooler air is denser, giving fuel-air mix more power.

BIRD'S BROTHER at right, though no slouch, has about 50 less horsepower, weighs hundreds of pounds more. New "eyelids" on Bird are main style change since car was first shown.

car characters. But they are not too concerned about it.

Happy Bird. The car is a sweetheart to drive. I got a crack at a Bird in July, the first non-company person, I was told, to be allowed to drive it. This didn't come easy. There were then only a handful of Birds in existence, and the project engineers didn't want to let go. In return for a promise not to put a stopwatch on it, and to do without some data that Ford wants to reserve for drum-beating later this fall, I was permitted to wheel it around some back Michigan roads as your emissary.

Slide behind the wheel, which is more nearly vertical than in conventional cars, and lock it at the point in its three-inch fore-and-aft travel that feels best. Then, if no sports-car enthusiast is glowering at you from under his beret, work the rise-or-fall and to-or-fro controls of the seat (standard equipment) to please your anatomy. If you've served much time on imported sports cars, you'll relish the shoulder- and foot-room. There is no feeling of having inserted your feet in a shrunken sleeping bag, no need to twist your right foot into bizarre deflections, and no difficulty in finding ample parking space for the left one. Fire up with the key-turn switch. You will like, I think, the music from the twin tailpipes. The engine speaks with all the authority of 292 cubic inches, disdaining the soprano yawps of smaller mills.

The Bird that I drove had an automatic box with a stubby range selector jutting up from the left side of the drive-shaft hump. It travels in a straight fore-and-aft arc through the positions, reading, front to rear: Park, Reverse, Neutral, Drive and Low. A thumb button on top releases a gate intended to discourage you from whanging it into reverse in an excess of enthusiasm. (Sometime when leisure permits, you may wish to muse on the oddity of designing an automatic's selector to imitate a genuine stick shift; it is a mysterious piece of associative merchandising, roughly comparable to building a popcorn machine into a television cabinet.)

Jiggered automatic. Even casehardened gear-shifters will grudgingly like one thing they've done to the automatic transmission. Move it to Drive, clear the road ahead, and abruptly floorboard the gas. You'll light out with a zip that no automatic in Drive has ever given

you before. Incidentally, don't try it on anything but a smooth hard-top road—even so, you'll get a moment or so of wheel-spin screech. The take-off is similar to (but brisker than) an automatic that's started in Low and then moved to Drive.

Actually, this is what they've taught the box to do for you. Ordinary Ford and Mercury automatics currently start in intermediate and upshift to high. The Bird's automatic does this too, so long as you don't floorboard it. But open the throttle wide at the start, or at any speed up to about 14 miles an hour, and the transmission instantly engages Low and plasters you back against the foam-rubber seats. Exact acceleration figures are Officially Secret, but you wouldn't be far wrong in thinking that a Bird might hit around 10 seconds in a zero-to-60 run.

HINT TO AN UNHANDY HANDYMAN

Catastrophe brews
And disaster impinges,
If you fail to use screws
And just nail up your hinges.
—Berton Braley

A road car. The Bird has a capable, alert feel, and is willing to try any darn-fool thing you ask it to. The springing is firm but not unpleasant; on a beat-up concrete road the expansion joints thrum at you, but no teeth rattle. On turns, she stays flat and relaxed, and slides or holds with a light touch of wheel or throttle. We found a gently curving dirt road where I learned that the Bird is willing to slide with the cool precision of a pair of skis. Finally the Ford man, pointing out cruel and unusual punishments in store if we wrinkled her, conned us onto the road home.

The top speed is currently one of Ford's darker secrets, but you needn't fall off your chair if she betters 119.

That 20-to-1 steering ratio is probably going to be criticized. Project engineers say defensively that it is an easy "transitional step" down from the stock Ford's 25.3-to-1 ratio. When you point out that many stock sedans have ratios as quick or quicker than the Bird's, it is explained that the car was not designed purely from scratch but was intended to use as many production parts as possible, and 20-to-1 was about as low as that gear could be pushed without upsetting the geometry.

New engine. When the Bird, which narrowly missed being sedatively christened the "Fairlane," was first shown to the public last March, the power plant was to be an overhead-valve, 160-horsepower V-8 of 256 cubic inches. Although Ford officials denied it, this was clearly the 1954 Mercury engine in false whiskers. At the projected curb weight of 2,833 pounds, this first engine gave the Bird a power loading of 17.7 pounds per horsepower, comfortably ahead of the Chevrolet Corvette's 19 pounds, and almost identical with the Jaguar XK 120's 17.8 pounds.

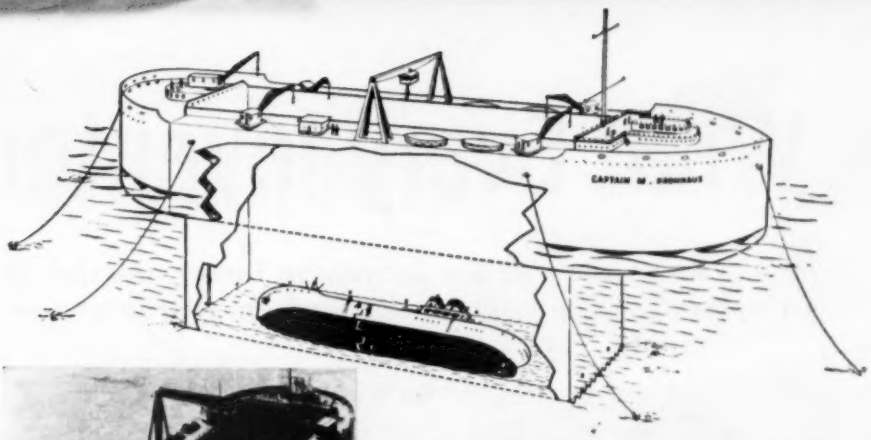
Later, it became apparent that production Thunderbirds would run several hundred pounds heavier—and that future Corvettes would probably get a hotted-up version of Chevrolet's spanking new V-8, due at the end of this month. Ford's decision, made early this summer, was to put a big 292-inch engine in the Bird.

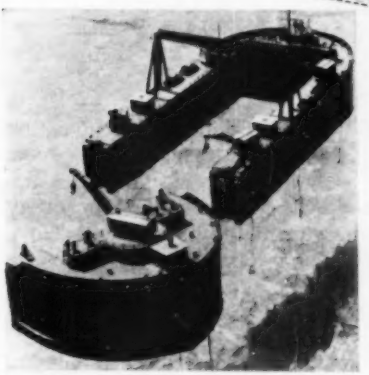
Rated horsepower is another of Ford's hole cards, but it is a reasonable inference that the new inches will add some 20 hp., to begin with, to the original 160.

Newest member of the Ford family of OHV engines, this one has a 3.75-inch bore and 3.3-inch stroke, a four-barrel carb and dual exhausts. The cooling system includes a big shroud around the fan and a special radiator, not borrowed from Ford or Merc, that is pressurized at 13-15 pounds, twice normal amount.

A manual-shift transmission will be standard, with overdrive or automatic as options. The axle ratios are 3.73 for manual, 3.90 for overdrive and 3.31 for the automatic. Clutch and brake pedals alike are the suspended kind. The Bird uses Hotchkiss drive, with five-leaf rear springs. Special rubber bumpers are mounted over strategic parts of the

[*Continued on page 272*]





Salvage Ship, Hole in Middle, To Raise Wrecks the Easy Way

TO RAISE ships sunk along coasts, Capt. Simeon Kronhaus, Los Angeles marine inventor, plans a 508-foot salvage vessel like the six-foot model at left. It will be towed, end open, over a wreck and the stern shoved in place. Lowered steel plates will form a cofferdam around the sunken ship. Pumps will get the water out to permit temporary repairs, and then water will be readmitted to float the wreck.

New Design Lightens Kick from Shotgun

PULL the trigger on this shotgun and the usual wallop in the shoulder is missing. What you feel, says its maker, is a "soft" pushing action instead of a sudden kickback. The new Winchester Model 50 semiautomatic has a nonrecoiling barrel and an independent chamber that moves less than 1/10 inch.

They Say Now.....

DR. VANNEVAR BUSH, PRESIDENT, CARNEGIE INSTITUTION OF WASHINGTON: *"It is man's mission to learn to understand."*

DR. STEPHEN J. ANGELLO, WESTINGHOUSE ENGINEER: *"We are on the verge of developing complete 'nervous systems' . . . which will not only tell machines and entire production lines what to do, but how to do it, when to do it, and how often to do it."*

PAUL H. BLAISDELL, TRAFFIC SAFETY DIRECTOR, ASSOCIATION OF CASUALTY AND SURETY COMPANIES: *"If we are to be a nation of superhighway users we must be aware of how to manage ourselves without . . . ending in disaster."*

SIR MILES THOMAS, CHAIRMAN, BRITISH OVERSEAS AIRWAYS CORP.: *"Unquestionably, the future in the air lies with . . . the jet, but some engineers continue to coax piston engines with fuels so rare they seem to be mixtures of liquid dynamite and fluid gold."*

What Every Inventor

Here is an expert's advice on what to invent, the way to get a patent, and how to make money from your invention.

THE AUTHOR, who gives inventors the benefit of his 20 years' research experience in this article, has more than 50 patents issued or pending in this country, and others abroad. Among his inventions he lists the Navy's "Bat" glider bomb used against enemy ships in Pacific warfare. Above, he demonstrates a recent invention of his for making stereo photos that need no viewing aid, when mounted behind a lenticular or ruled screen. Between two successive exposures, a mechanism shifts both the camera and a screen within it, or a slit before its lens.

By Waldemar A. Ayres

Director of Research & New Product Engineering
White Sewing Machine Corporation.

EVERY minute, you use an invention that has made a fortune for someone. There are fabulous success stories behind simple inventions like the safety razor, the zipper, the hairpin with wavy sides, rubber heels, crimped-metal bottle caps.

What are your own chances of fathering a successful money-making invention?

Statistics are discouraging. About 80,000 patents are applied for—and half as many issued—in this country each year. Only five out of 100 patented inventions repay even the cost of the patents.

No crystal ball can forecast that your invention will be one of the exceptions. Admittedly, inventing is a tough game.

But there are ways to go about it that should give you a better-than-average chance of success. First and most important, devote at least as much intelligent thought and effort to choosing *what to invent* as to working out your invention.

To receive a patent, your idea must be new, useful and original—that is, not obvious to anyone skilled in the field. But you should go beyond those minimum Patent Office requirements.

"Costs a Dime, Sells for a Dollar"

Most money has been made out of inventions that:

- Meet a real need.
- Are simple and easy to make.
- Can be made by companies already in existence.
- Can be adopted without requiring

Should Know

AMONG INVENTIONS SEEKING SPONSORS at recent Cleveland show was this handy sanding block devised by Richard G. Thompson of Stillwater, Minn. Multiple layers of sandpaper, coarse on one side of the block, fine on the other, are attached by adhesive strips near ends. Peeling off a worn sheet exposes fresh surface. When all sheets are gone, user buys a new block.

people to change their living habits.

- Have a short life, so that there will be many repeat orders.
- Sell at a lower price than competing articles; or have advantages that justify a higher price.

"The ideal money-making invention," a saying goes, "costs a dime to make, sells for a dollar, and is habit-forming."

Protecting your invention begins long before you even apply for a patent. When you make an invention, write out a "disclosure" of it at once. Leading inventors have gotten out of bed in the middle of the night to do it.

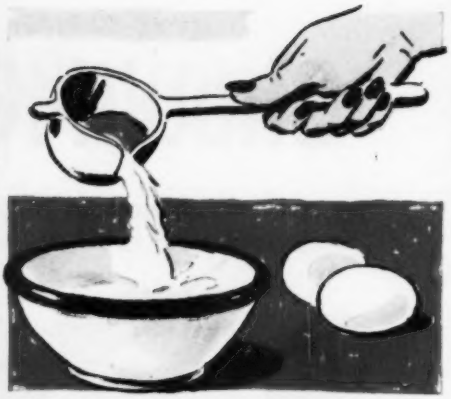
This invention disclosure is simply a written statement of what your invention is to do and how it will do it. So long as your statement describes these things clearly, it can be quite informal. Sign each page, and date it in your own handwriting. Then have others, preferably two people or more, witness it. Under a phrase such as "*Explained to and understood by me:*" each witness should sign his name and the date in his own handwriting.

Research Saves Double-Tracking

Now you should check on "prior art"—in other words, find out what has been done in the field before, so as not to waste your time and money perfecting something that has already been invented. Consult books and periodicals on the subject with which your invention is concerned, at your local library. Such indexes as the *United States Catalog* and *Cumulative Book Index*, the *Industrial Arts Index* and the *Readers' Guide to Periodical Literature*, should lead you to most of what has been published in this country in recent years.

After this preliminary check, however, a search of patents that have been issued offers the only way to make sure your

INTERESTED BUSINESSMEN, mingling with hopeful inventors at Cleveland show, inspect author's stereo-photo exhibit. They also saw items pictured at right. Some 100 new ideas ranged from a cake cutter to a steel-making furnace.



EGG SEPARATOR divorces white of egg from yolk, by pouring it out through slot in side of ladle-shaped kitchen utensil, as shown above. This household aid was patented by a woman inventor, Marguerite Polcar of Cleveland.

idea is new. If you wanted to, you could walk into the Search Room maintained by the Patent Office at Washington and tackle the job yourself. But an inexperienced searcher would find it tough going, among more than 2,600,000 patents, divided into 309 classes and 47,000 subclasses. A reputable patent attorney usually will make a thorough and competent search for a moderate fee, and furnish you copies of patents for inventions most nearly like your own.

Likewise, the Patent Office does not require you to employ an attorney or patent agent when you apply for your patent. You could prepare your own application, file it, conduct the proceedings and obtain a patent. Again, however, anyone lacking experience at this would be wiser to have it done for him by an expert. Otherwise he would have no assurance that his patent adequately protected his invention.

Advice for the Asking

Every inventor can profitably study a little pamphlet, *General Information Concerning Patents,* telling just what can be patented and how to go about it. You can get it free of charge by writing to the Commissioner of Patents, Washington 25, D. C.

Usually the Patent Office does not require you to submit a model of your invention. Nevertheless, you should build one, if possible.

A working model will show whether your invention really works. If there are faults, often a model will show how to cure them. Designing for appearance is aided by a model, too. And certainly a working model will prove more effective than patent drawings in persuading a manufacturer or distributor to put money into your invention.

A patent application consists of text and drawings prepared exactly in accordance with Patent Office rules, which are outlined in the pamphlet just mentioned. The filing fee is $30. If your application is found in order, it goes to a Patent Examiner.

Waiting Time: Three Years

When the Examiner's action upon it is favorable, you will be notified that your patent application is "allowable." Don't be impatient; it takes three years, on the average, to receive this notice. You then send a final fee of $30, and your patent will be issued.

If the Examiner's action is unfavorable, you will be told why. Then your attorney and the Examiner will correspond with each other until agreement is reached. Or, failing that, you will be offered

CHILD'S THREE-WHEEL SCOOTER is propelled when rider shifts weight back and forth between pair of rising and falling pedals, each linked to a rear crank axle. Inventor of vehicle is C. W. Chamberlin of Cleveland.

COMBINATION VALVE for shower has two control knobs. One mixes hot and cold water. The other controls spray, without changing temperature setting. Harold Straitwell Jr. of Lowellville, Ohio, has applied for a patent.

an opportunity to request an appeal.

A patent, not renewable, gives you for 17 years the right "to exclude others from making, using or selling the invention throughout the United States."

To be profitable, of course, your invention must be manufactured and sold. You don't have to wait for a patent to go ahead with the selling end, but it is best to have your application in.

Turning Inventions into Cash

Here are three ways to handle your invention, in the order of your chances to make the most money out of it:

Make and market it yourself. This takes capital and know-how, and involves the most risk. But it yields the greatest return from a successful invention.

License it for manufacture and sale at a royalty. The usual arrangement is five percent of the wholesale price.

Sell your patent rights outright. This is the safest way, but usually the least profitable.

Marketing your invention calls for salesmanship. First, make a list of manufacturers who might be interested—preferably makers of articles or materials in the same field as your invention. You will find manufacturers listed by products in *Thomas' Directory of American Manufacturers* and in *Moody's Manual of Investments, American and Foreign: Industrial Securities,* commonly called "Moody's Industrials" for short. These annual directories are available in most libraries, as are other market studies. If there are trade journals or trade associations in your field, write to them.

When you have a list of prospects, it is best to call on them personally. Pick one of the least promising ones for your first visit. Through practice you will then have improved your sales talk, when you call on likelier prospects.

Recently the Cleveland Engineering Society took an important step to help inventors with their problems, including marketing their inventions. Its Machine Design Division held an Inventions Exhibit and Conference at which models or drawings of some 100 new inventions were shown. As a result, manufacturers and businessmen attending the conference became interested in several of the inventions.

A second of these "inventors' clinics" is likely to be held some time next year. If you have an unmarketed invention, and the luck to have it chosen for exhibit there, it might be to your advantage. The secretary of the Cleveland Engineering Society, 2136 East 19th Street, Cleveland 15, Ohio, will be glad to send you an entry blank. END

Pogo-Stick Plane Makes Its First Flight

THE man you see climbing into the airplane cockpit, in the picture sequence above, is making history. He is the first pilot ever to take off straight up in a

Supersonic Navy Fighter Is Built to Operate from Carriers

SEEN here taking off from a Long Island, N.Y., test airport is one of the world's few airplanes that can go faster than sound in level flight.

A Navy jet called the Grumman F9F-9 Tiger, it will be made in quantity for operation from carriers. Its wing tips fold manually for storage below decks.

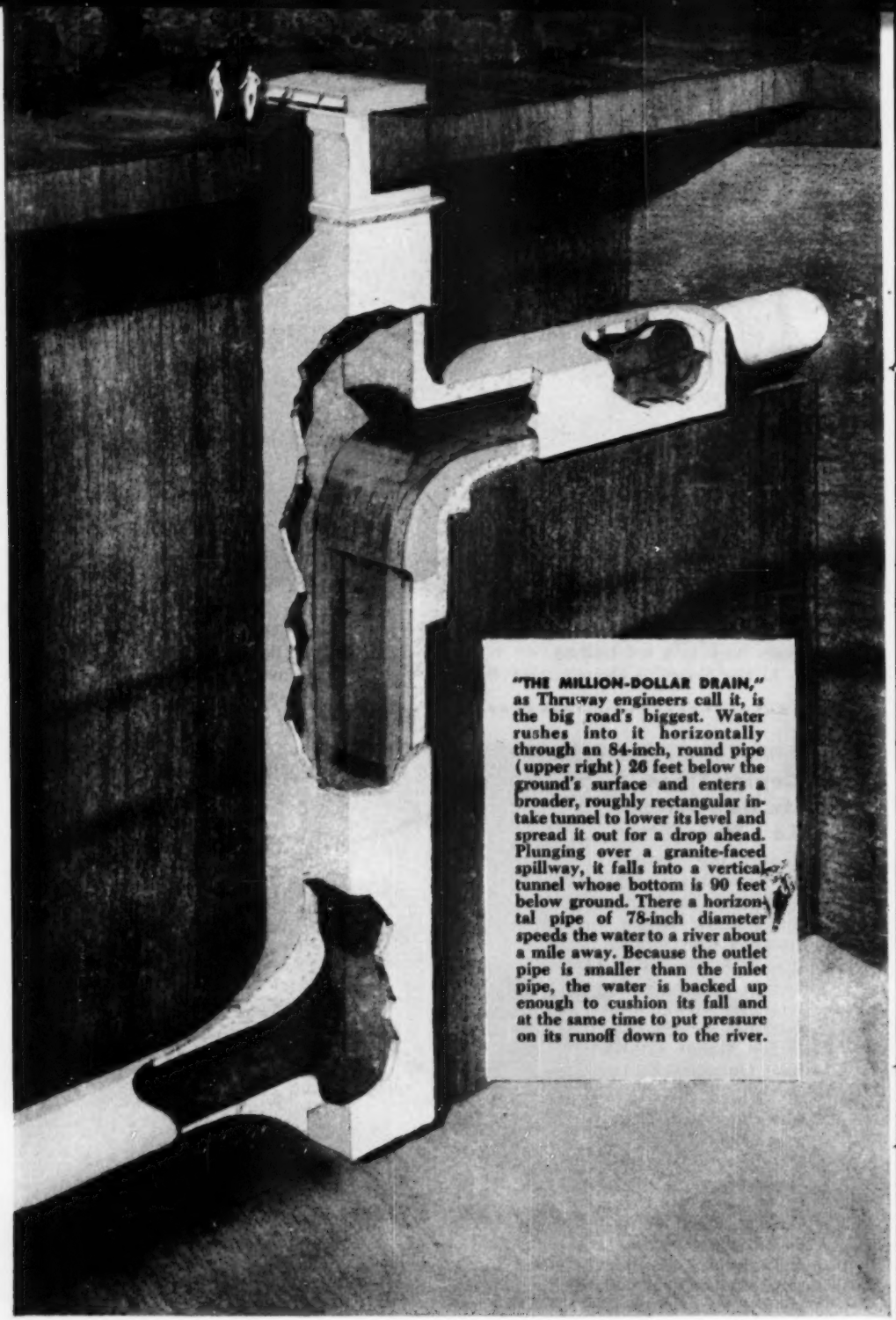
fixed-wing plane and land straight down. He revs up, becomes airborne and then eases back to a tail landing.

J. F. "Skeets" Coleman is at the controls of this Convair XFY-1 at the Moffett Naval Air Station, Calif. A new Navy fighter, it is designed to operate from the decks of ordinary ships.

Copter Totes Its Own Hangar To a New Site

AND the Marines get into the act with a helicopter that picks up its own hangar. Covered with fabric, it could be used as an aircraft or troop shelter. This was an experiment carried out at the Marine Corps base, Quantico, Va.

▶▶▶The British have a true supersonic fighter now, too. It is the English Electric P-1, test-flown late this summer. Each of its two Armstrong-Siddeley Sapphire turbojets can produce 10,000 pounds' thrust.



"THE MILLION-DOLLAR DRAIN," as Thruway engineers call it, is the big road's biggest. Water rushes into it horizontally through an 84-inch, round pipe (upper right) 26 feet below the ground's surface and enters a broader, roughly rectangular intake tunnel to lower its level and spread it out for a drop ahead. Plunging over a granite-faced spillway, it falls into a vertical tunnel whose bottom is 90 feet below ground. There a horizontal pipe of 78-inch diameter speeds the water to a river about a mile away. Because the outlet pipe is smaller than the inlet pipe, the water is backed up enough to cushion its fall and at the same time to put pressure on its runoff down to the river.

RAINDROPS ON THE RUN stream into one of the thousands of cross culverts that drain the Thruway's broad, shallow, V-shaped mall, which catches the runoff from inside traffic lanes.

The New York Thruway will have 427 miles of

Puddleproof Pavements

World's longest superhighway is so built and drained that rain rolls right off its back.

NO MATTER how hard it rains, you won't be able to find a "bird bath" on the 427-mile, four-to-six-lane New York State Thruway. "Bird bath" is engineers' slang for a pool of surface water.

The biggest and longest superhighway in the world—400 miles of which should be ready for your car in December—will also be one of the world's best-drained thoroughfares. Its concrete surface will cover 120,000,000 square feet! But this $572,180,000 toll road has been designed

ARTIST'S VIEW (right) of the Yonkers interchange shows area biggest drain will serve.

Good drainage for the Thruway is also a matter of good housekeeping

WINTER AND SUMMER, maintenance crews will be busy at tasks essential both to keeping the pavements clear and the road neat in appearance. A total of 84 plows, in teams of three, will toss snow away from the mall to keep it as open as possible for drainage. In summer, 95 mowers of four types will keep the grass cut short.

and constructed so skillfully that raindrops will find no place to loiter on it when it is finished in mid-1955.

Of the 500,000 feet of reinforced concrete pipe buried in short sections beneath the divided double lanes, a very large proportion is devoted to keeping the clean white pavements free of water. Pools in the path of fast-traveling automobile wheels are dangerous in summer, doubly dangerous in freezing weather. The Thruway, which will permit passenger cars to go 60 m.p.h. and be the favored route for 50,000,000 auto trips a year, has been engineered for safety at all seasons.

In addition to making the road puddle-proof, its designers saw to it that no grade on it would rise or dip more than three feet in 100. They made the curves so flat that at no point can you fail to see at least 1,000 feet ahead and behind.

Fat, rigid veins underlying a skin of concrete and gravel, the concealed miles of drainage pipe—enough, if joined, to link New York to Philadelphia—give the superhighway a healthy circulation.

Some of the pipes, their joints unsealed but swathed in burlap, help absorb subsurface dampness that might otherwise disrupt the road's foundations. Others, tightly sealed against seepage, provide artificial channels for small streams to follow as they flow under the Thruway. But most of the pipes, the cross culverts, also sealed, carry off drainage from the gently depressed, grassy corridor, or mall, between lanes and deposit it in outlying ditches that parallel the road.

Every 500 Feet—an Open Mouth

These pipes range in diameter from 18 to 48 inches and in length from 80 to 100 feet. Their open mouths, sunk six inches below grade to speed the water's flow, catch the divided lanes' runoff at intervals of approximately 500 feet. The water that runs out their lower ends is guided as frequently as possible into natural drainage channels, such as nearby brooks, swamps or ponds.

One important factor in determining the diameter of the pipes to be used was the history of rainfall in each area. Over a route 400 miles long, this history varies considerably.

The road's designers first decided where they wanted to locate the drain-

age pipes. Those locations were then checked against topographical maps that enabled them to estimate how much runoff they normally could anticipate in the area. Finally they looked up the official rainfall tables for each locality and found the heaviest storm in a period of 10 years. The pipes selected had to be big enough to handle a storm of that size.

To appreciate the drainage design, you must first be able to visualize a typical cross-section of it. The best way to do this is to think of a very broad, exceedingly shallow capital M.

Square off the twin peaks of the letter and imagine them to be the foundations on which the two double lanes of concrete pavement rest. Each peak has now become a plateau 34 feet wide, accommodating two slabs of concrete and a strip of gravel. The dip between the plateaus is at least 44 feet wide, but at its deepest point it is no more than 21 inches lower than the crowns of the flanking plateaus.

The outer slopes of the plateaus slide down to ditches, which form a continuous shallow V, 24 to 26 inches below the crowns of the plateaus. Now consider an individual, squared-off peak of the M. On it, from left to right, lie a slab of concrete 13 feet wide, a slab 12 feet wide and a strip of calcium-chloride-treated gravel nine feet wide.

The two slabs of concrete tilt downward very slightly to left and right from the edge along which they meet. A raindrop that hits the crown of the road is bound to start rolling.

Grassy Slope Hastens Runoff

If it rolls toward the outside of the road, its speed will be increased by the additional tilt of the shoulder and by the steeper, grassy slope beyond.

If it rolls toward the inside of the road, it will gather momentum as it glides down into the mall. In a heavy rainstorm, the center of the mall quickly becomes the bed of a stream racing toward the nearest drainpipe opening.

On the relatively few sections of the Thruway where tree-covered hillocks have been allowed to remain in the mall, and perhaps one double lane of the highway is at a higher level than the other, ditches have been dug at the base

[*Continued on page 274*]

PSM Readers Tee Off on

Hundreds sass critic of U.S. cars, scores agree with him and dozens straddle the issue. Here are some of the best letters.

HUNDREDS of readers, inflamed or enthused, have poured in letters condemning or praising the article "A Britisher Tees Off on American Cars" in our July issue, page 66. In that article Laurence Pomeroy (inset), well-known English automotive writer, found some good and much to criticize in Detroit's products.

The letters, which have come in from all over the world—including Peru, Alaska, Germany, India, Australia, Portuguese East Africa, and many from England itself—break down this way: eight percent are on the fence, 25 percent agree with Mr. Pomeroy, and 67 percent are hostile to him. A half-dozen of the best are printed below.

Grown-up Cars for Grownups

YOU are absolutely correct, my dear English cousin. Our cars are more expensive to purchase, operate and repair. They are big and bulky. Could it be that is the way we want it?

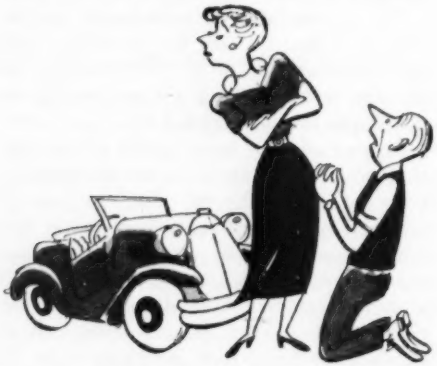
As children, most of us had the desire to ride around in a big red fire engine, swerving in and out amongst pedestrians. But most Americans grow up. We have discovered, in maturity, that the auto is not the end in itself, but only a means to an end.

J. Ross Young, Cambridge, Ill.

Keeping Up with the Joneses

AMERICAN cars *are* too large, with too much power. How often do you have six people in your car? When does the average slob have a chance to use 235 hp.?

Pomeroy is right about our buying big cars to keep up social equality with the



neighbors. Despite the savings a small car would bring, there is one reason I can't trade in my present car for a small one: My wife won't let me.

Sy Levin, Baltimore

British Car Expert

"I Nearly Drowned . . ."

READ your article praising English cars. Used to own one myself. It reminded me of a little bug. I was always scared that somebody would step on the thing.

It did save gas though. After three weeks of sputterin' and fallin' apart the bug quit runnin'.

Maybe I had a "lemon-seen," don't rightly know. But prior to quittin' time it suffered a broken gearshift, developed a leaky windshield and contracted a severe case of Montana Road rattles.

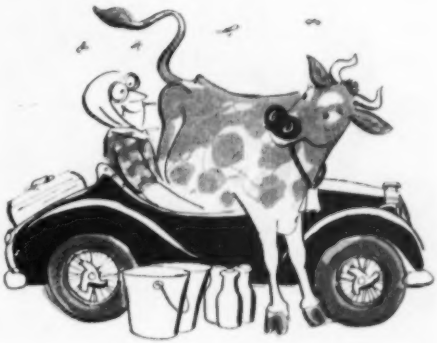
Also during that time I nearly drowned while fording a two-foot creek with the car, and strained a half-dozen back muscles squeezin' my six-foot frame into your "comfortable" four-seater. Shucks, you don't "get in" those cars. You "try 'em on" like a coat.

For my money, you can't put an English saddle on a Western pony.

I've switched back to my American-built "foreign" car—'41 vintage, French name. It runs fine!

PAUL FUGLEBERG, Great Falls, Mont.

Milk Stool Vs. Easy Chair

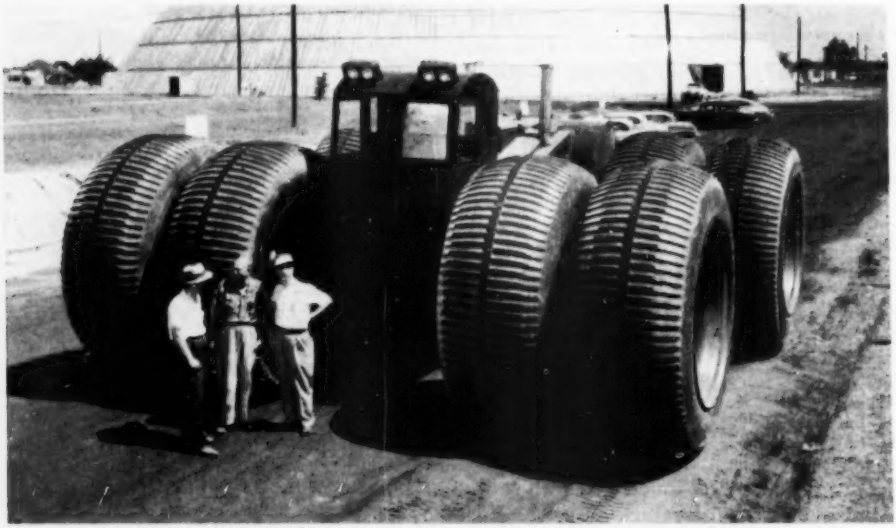


COMPARED to those overgrown motorcycles he regards so highly, Mr. Pomeroy complains the Amer-

[Continued on page 276]

Peeping Tom Can Snap Enemy Positions 30 Miles Away

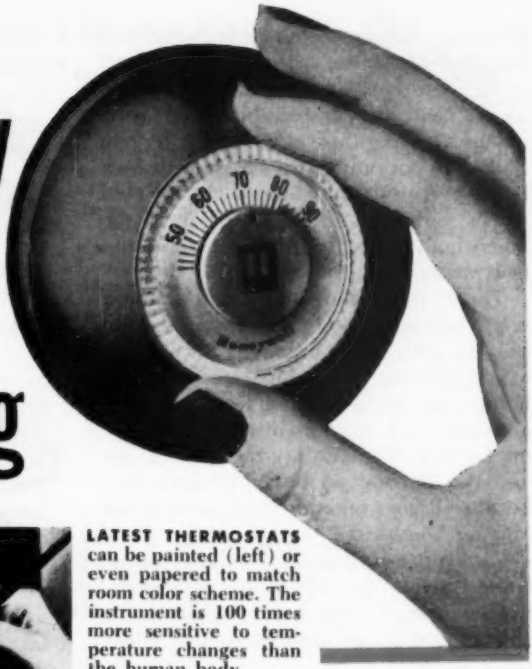
THE Signal Corps' new Peeping Tom supercamera lives up to its name. It uses infrared light to photograph objects 30 miles off, or to pick up detail on a jeep at six miles. In a demonstration at Washington, its 100-inch lens snapped this close-up of the Lincoln Memorial while set up at Arlington National Cemetery, 2½ miles away. By way of comparison, the photo at left above, made with a standard press camera, also includes the Lincoln Memorial—almost indistinguishable at the upper right.



Sno-Buggy Has Electric Motors in Wheels to Turn 10-Foot Tires

THESE 10-foot tires, the world's largest, carry only five pounds' pressure and leave four-foot-wide tracks when the 23-ton vehicle mushes through snow. Its 400-horsepower engine runs a generator powering four drive motors. To steer, the driver flips electric switches. The LeTourneau Sno-Buggy is now heading north for tests.

What's New in Home Heating



LATEST THERMOSTATS can be painted (left) or even papered to match room color scheme. The instrument is 100 times more sensitive to temperature changes than the human body.

Tricky controls anticipate cold snaps, while furnaces can now be tucked away 'most anywhere.

By Devon Francis

IT'S coming the time of year when maybe you feel like the man in Omaha.

He had a wife, they say, who was always fiddling with the thermostat to the furnace. One minute she was cold, and she pushed it up. The next minute she was hot, and she pulled it down. Her husband got fed up.

One day, while she was out, he yanked the wiring out of the thermostat and put it in a new thermostat that he had squirreled away in a remote corner of the house. His wife went right on for years fiddling with the dead thermostat.

The story illustrates nothing whatsoever except that practically everybody begins having furnace troubles of one kind or another, at one time or another, after frost gathers on the pumpkins, and everybody blames the furnace.

In the past that was not unfair. The furnace often was to blame. But now, at last, a scientific approach is being made.

Designers Make It Hot for Homeowners

If you live in a house with a dated furnace, you can now install controls for the precise generation and distribution of heat. Or you can renovate your distribution system.

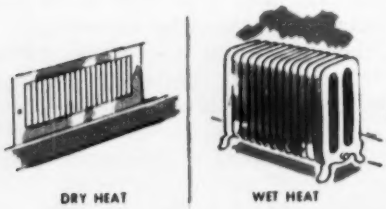
If you're buying a new house—well, name what you want in heating units. You can have it. A whole new family of furnaces, tailored to the needs of the individual home, is now on the market. More important, new ways of transmitting furnace heat to the walls, furnishings and air in the house have been devised.

What's involved in heating a house?

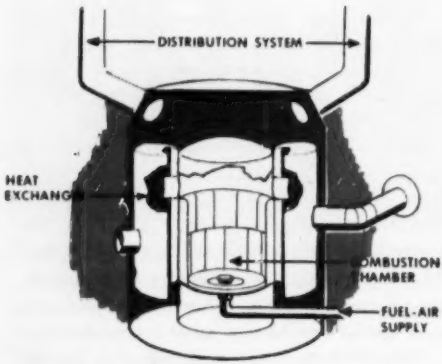
Basically, it only means introducing heat into it at about the rate that it loses heat to the outdoors. Furnace heat is replacement heat. A comfortable heat level means a temperature at which the human body will not radiate too much of its own heat. A feeling that one's feet are cold comes simply from the transfer of too much body heat from the feet to the objects or air around them.

There is nothing mysterious about home heating. The homeowner gets into trouble with it by buying a furnace in utter ignorance of his needs. Many homes are badly heated because some get-rich-quick builders install the cheapest furnace they can lay their hands on, and the starry-eyed buyer is enchanted because it goes on and off by itself. Look Ma, no hands!

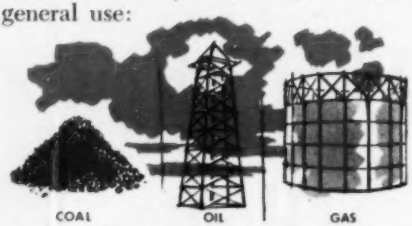
More pure rubbish is circulated about home heating than about any other subject connected with a house. There are only two ways, in general use, of heating a house:



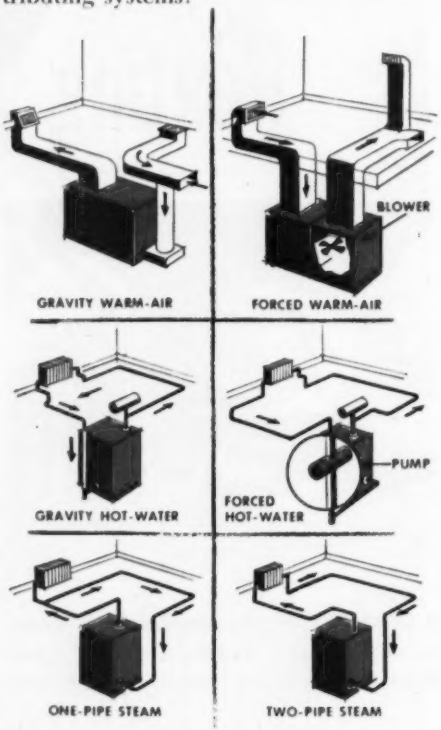
There are only four components to a furnace:



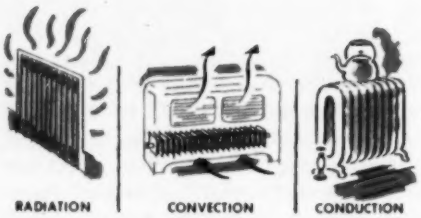
There are only three kinds of fuel in general use:



There are only six kinds of heat-distributing systems:



There are only three ways of transferring heat, after such distribution, to a room and its occupants:



Little-Known Facts About Home Heating

Heat losses through a window, even with storm sash, are four to 10 times that of an equal area of wall.

Fumes from an oil-fired furnace can be caused by back drafts from a chimney not hooded against the weather.

A too-rapid change in temperature of as little as three degrees will create a sensation of being too warm or too cool.

It requires a higher room temperature to keep warm in cold weather than in mild.

A thermostat should never be installed anywhere near a much-used fireplace.

A layer of builder's paper between rough and finish flooring will save fuel.

A certain amount of heat loss through the flue is necessary to maintain a proper draft in a furnace to prevent unwanted condensation of flue gases.

In calculating the amount of heat necessary for a house, a heating contractor usually allows for a 15-to-20-percent loss through the distribution ducts or pipes.

But from this point on, the problem of home heating is not so simple. That's because the design engineers and the furnace manufacturers have devised new ways of controlling the distribution of heat. Homes can be made more comfortable now because the heat can be squirted where it's needed, like water from a garden hose.

The trick is to control the *rate of transfer* in the entire living area of a home. That's what the new ideas in home heating are aimed at.

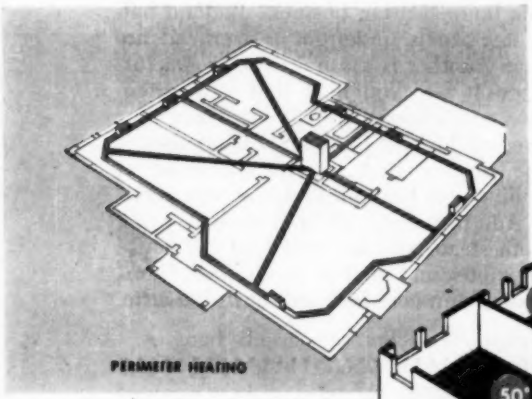
The biggest single comfort factor in home heating is keeping the outside walls warm. The biggest single problem there is warming the window areas.

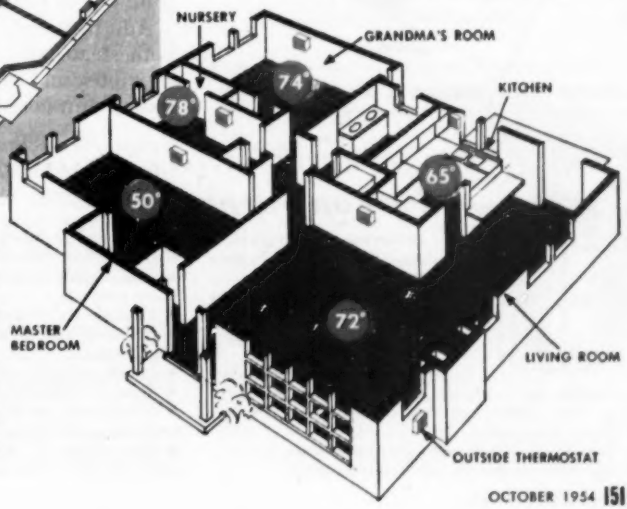
Assuming that your house has well-insulated walls—and, if it hasn't, shame on you!—it can be kept cozy with what's known as perimeter heating. The furnace sends heat to the very places where the greatest radiation to the outside air is occurring: the outside walls and window areas.

Hot, Cold and In Between

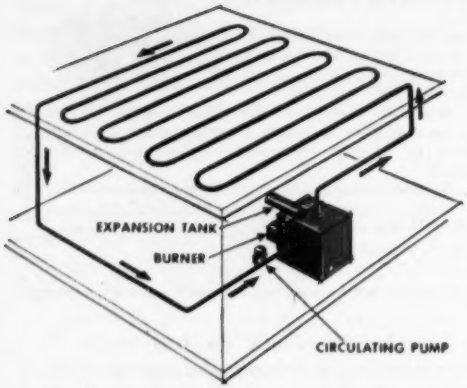
Even newer than perimeter heating is the idea of individual-room or zone temperature control. In effect, you abandon central heating and adopt the system used by King Arthur and his knights.

You can zone your house into bedrooms, living room-kitchen-bath, and

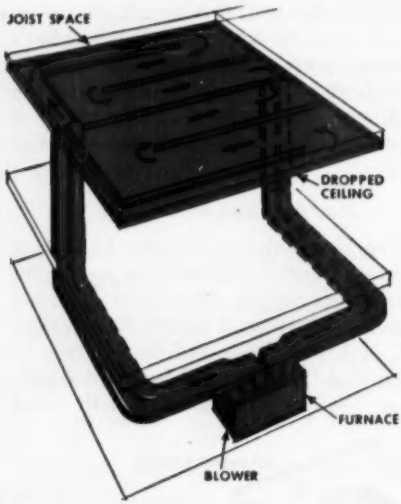




NEW HOME-HEATING IDEA is piping heat to outside walls for uniform warmth in room (above). Perimeter heating, as it is known, prevents incoming cascades of cold air from making floors cold. Another new idea is multiple thermostats (right) for individual-room or zone control. An outside thermostat sniffs weather changes, keeps inside heat level.



PIPING IN FLOOR OR CEILING creates this huge panel of even, radiant hot-water heat.



RADIANT-PANEL HEATING is not limited to hot-water systems. Here it's done with hot air.

basement, for instance. Or, if you want the ultimate in sophisticated heating systems, you can make grandma's room 74 degrees, your bedroom 50, the kitchen 65, the nursery 78, the rumpus room 68, and the living room 72. The only thing that keeps the furnace from going into a complete nervous breakdown over all this is thermostatic control of valving.

Just as new are heating systems that respond like lightning to changes in the outside temperature. Most automatic heating lags when the temperature plummets outside. By the time the thermostat gets the furnace going, the house has radiated so much heat to the outside that hours are required to get it warm again.

But the new systems have an electronic thermostat *outside* the house, sniffing the *outside* air. The furnace thus can *anticipate* an increased loss of heat to the outside, and room temperatures remain normal.

Pay Your Money—Take Your Choice

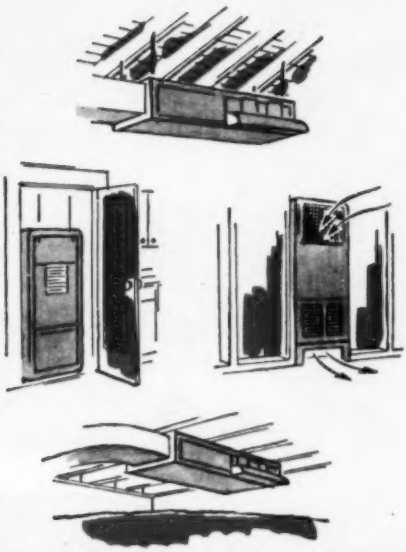
There are lots of other new things in the home-heating business. Radiant hot-water panels, underfoot or overhead, are one. Another is the individual-room furnace—it lets you heat that new extension on the house without disturbing your present heating system. Still another is the furnace that can be converted at trifling cost from oil to gas or vice versa.

And then there are split systems, using both steam and air, that heat the house in winter and cool it in summer; "horizontal" furnaces that will fit in the attic,

Tips on Furnaces

In buying a heating plant, these are important factors to consider:

- Number of cubic feet to be heated.
- Average winter temperatures in your locality.
- Quality of the insulation in outside walls, window areas, ceilings, floors, between the rafters; amount of weather stripping.
- Total glass area.
- Structure's exposure to the weather.
- Radiation properties of materials used.
- Type and architecture of construction—concrete slab, one-floor bungalow, etc.
- Desirabiltiy of zone or individual-room temperature controls.
- Desirability of outside-inside thermostats.
- Prices of gas, oil and coal in terms of their heat production.
- Room available for furnace installation.
- Ease or difficulty of insulating ducting.
- Prospective additions to house that would create fresh demands on system.
- Desirability of individual furnaces for one or more portions of house.



MORE COMPACT FURNACES will fit almost anywhere in the house—under the rafters, in a closet, between studs on standard 16-inch centers, and even in a crawl space under the floor.

RADIATORS NEED NOT INTRUDE on the room—metal baseboards or ceiling boards do a better job of heating and leave more space for furniture. So does a register high on wall.

or in a crawl space to whip the bugaboo of cold floors; and slim-jim jobs that can be recessed between a couple of studs.

Cutting the heating bills is a matter of installing the right kind of furnace using the right kind of fuel, a proper distribution system, and tailored heat outlets in a well-insulated house.

Putting a blanket of warm air against a cold outside wall or big picture window will save money, too. It cuts down the length of the "on" and "off" periods of the furnace.

Thermostat Keeps Furnace on the Job

A good thermostat will save money and supply more comfort by making the furnace work a little bit, often, instead of prodigiously after long periods of somnolence. Boiler-type furnaces, long idle, have to heat themselves up before they can heat the house.

A thermostat improperly installed can unhinge everybody in the family. One homeowner couldn't understand why the house got cold whenever a member of his family took a bath—until he discovered that his thermostat was on a wall over the hot-water pipe to the bathtub.

And another man dated his furnace troubles from the time the new television set arrived. His wife complained of cold floors. His daughter got the sniffles. He developed permanent goose pimples. All blamed the furnace.

It took about one minute flat for a furnace-repair man to locate the trouble. You guessed it—the heat-generating TV set was under the thermostat. END

Figuring Fuel Costs

In heat produced, one ton of coal equals 186 gallons of oil or 26,000 cubic feet of gas. If gas, oil and coal are all available to you as furnace fuel, here's how to figure their relative costs:

Get the local cost of one ton of coal $_____

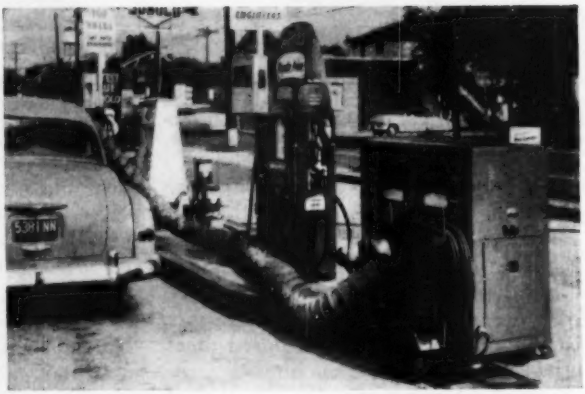
Get the local cost of one gallon of oil and multiply by 186..... $_____

Get the local cost of 1,000 cubic feet of gas and multiply by 26..... $_____

Water-Soaked Cap Cools Hot Heads

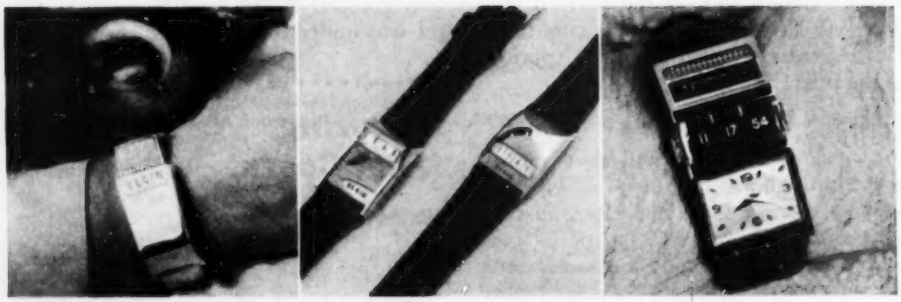
THIS hat of cellulose sponge is a one-man "air conditioner" that needs no power supply. Worn wet, it works like a Spanish water jug, cooling your head as the moisture evaporates. It will keep sportsmen cool in the sun and make life easier for workmen in high-temperature jobs. Chill it in the refrigerator and you can use it as an ice pack. The Kay-Gee Corp., Milwaukee, calls it the Kool Kap.

Fill 'er Up —with Cool, Dry Air!



EVEN drive over the hot plains of the Southwest? Nowadays when you drive into a service station out there, the pump tender may drop a big flexible hose into your car to give you a quick cool-down while you are gassing up.

A Chrysler Airtemp portable air conditioner spews gobs of invigorating cool, dry air through the hose.



Designers' Flights of Fancy Turn Out Watches of the Future

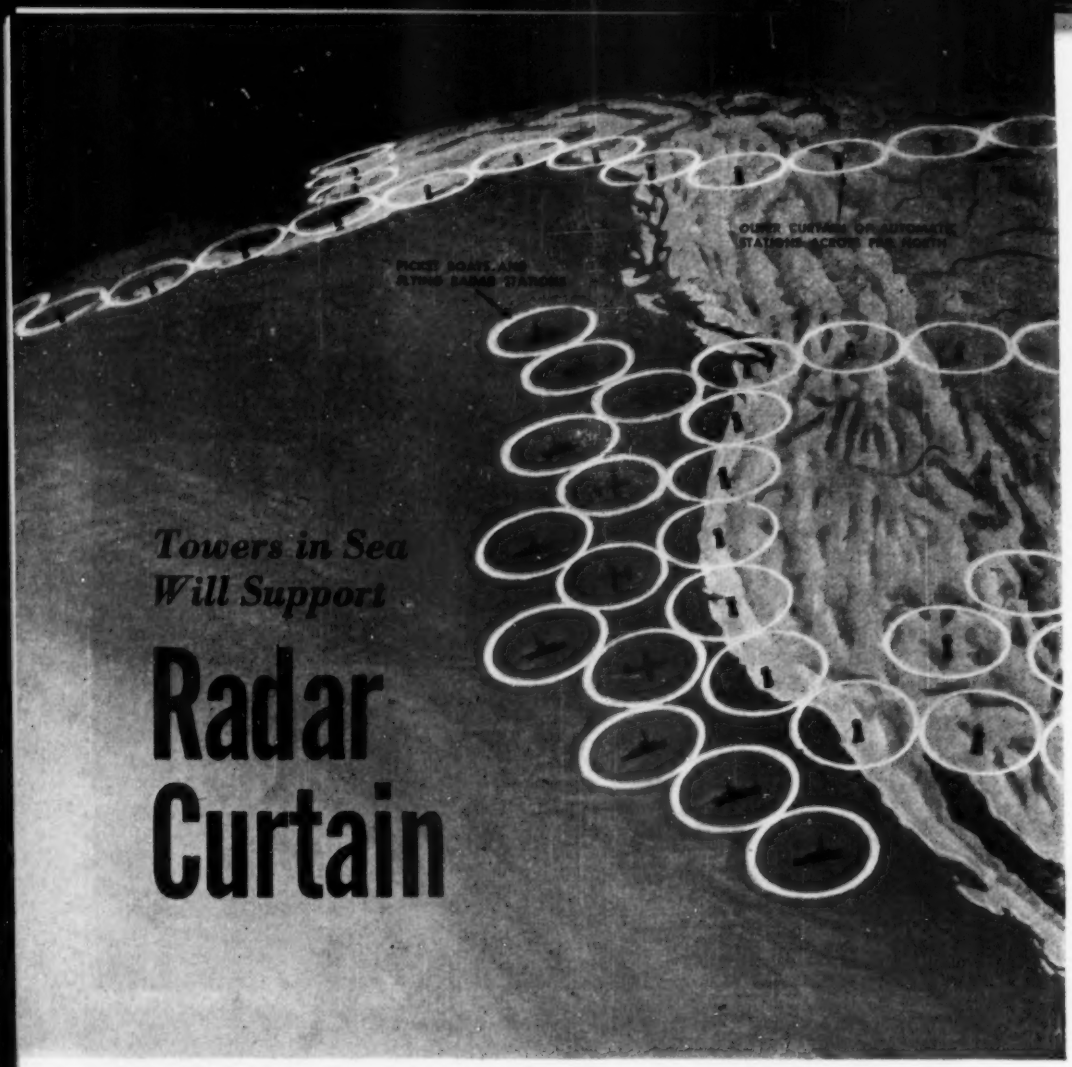
WATCH designers took a busman's holiday to dream up these "timepieces of the future." To let you tell time by ear, the one at left above would bring in time signals broadcast every five minutes by the radio networks. A direct-reading dial on another (center) would work like a car's odometer dial. And for this atomic age, the watch at far right has a spectrum dial, set above a calendar and a standard face, to warn the wearer of radiation. The watches, without works, were exhibited by Elgin.

Trick Rostrum Makes Long Stories Short

SCIENTISTS rigged up this remote-controlled rostrum to gag long-winded speakers. If a speaker talks too long, a puff of smoke blows up in his face and laugh-provoking cartoons appear on a screen behind him. The electronic gadgets at the chairman's elbow (below) also speed up the clock when a talker gets behind schedule and warn him two minutes before he is due for "the works." Standard Oil scientists say the system has cut down wordage at meetings.

Jellied Paint Won't Drip, Yet Flows Off Brush Smoothly

THAT tipped can below holds paint that won't spill. Thick as jelly, it spreads like butter. It never has to be stirred because it can't settle, and it won't drip from the brush, sag, curtain or bead. You can brush it on, roll it on or even spray it. A new substance, called Burnok, "gels" the paint, making it spillproof. But under slight friction it flows readily onto a surface. Several manufacturers are now using Burnok vehicles in their oil-base paints and enamels.



Towers in Sea Will Support

Radar Curtain

A MODERN version of the Great Wall of China is being built by the United States against air attack. The wall is invisible. It consists of radar signals, probing for unidentified aircraft.

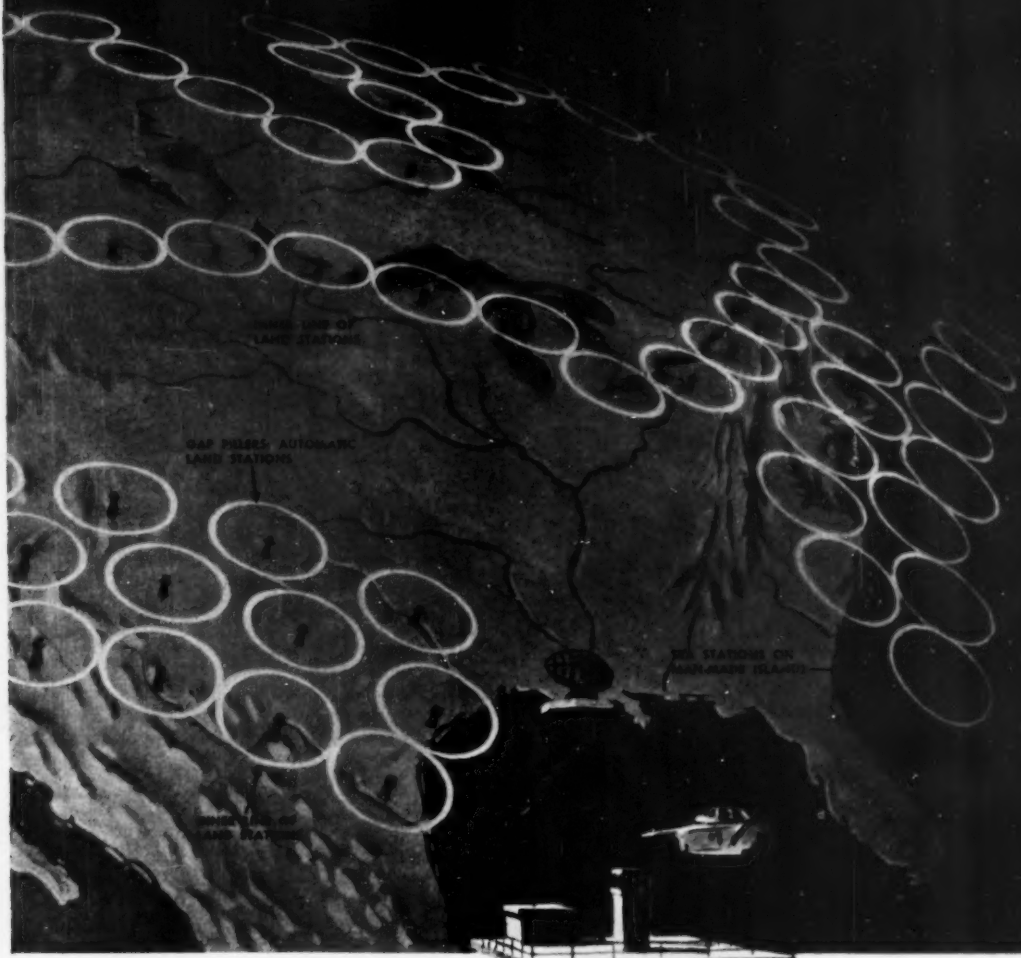
Newest addition to the wall will be a radar curtain projected from a series of artificial islands off the Atlantic coast from Virginia to Newfoundland, as much as 125 miles from shore.

Construction of such a chain of radar stations is possible only because the wide continental shelf off the Atlantic coast provides shallow water.

At the same time, gaps in the existing radar-defense wall will be filled with 485 new radar-warning installations across the top of the nation.

Off the Pacific coast, where there is no continental shelf to build artificial islands on, Navy picket boats and long-range, radar-toting airplanes throw up a wall to warn of hostile aircraft.

Picket boats and planes also patrol the Atlantic coast south to Florida, beyond the projected island stations. And early-warning networks link our Caribbean bases and stretch across the Arctic hundreds of miles north of our northern borders.



MAN-MADE ISLAND for chain of radar stations off Atlantic coast is patterned on platforms used by oil drillers in Gulf of Mexico. Built on land, islands will be towed to sites at sea. There six-foot caissons will be dropped to ocean floor through holes in platform, and air jacks on caissons will lift platform above water. A tower will contain radar, radio and weather stations. The islands will generate their own electricity and provide quarters—including recreation facilities—for 20 to 30 men. Bright spot: Crews will be rotated monthly.

WILBUR SHAW REPORTS FROM

They've

REMOTE CONTROLS make outboarding more fun than ever. To start up (above) I just pushed a button that works through a six-volt auto battery and a solenoid to turn over the quiet Sea-Horse 25. Under way (below) all I had to do was handle the wheel and throttle. Those short, choppy waves are typical of the Great Lakes. At 30 m.p.h. I hit a hefty swell (right), and for an instant I was actually flying. Boat and I got soaked, but the motor didn't even cough.

Rubber cushions, a new intake silencer and a tricky muffler quiet this husky 25-hp. kicker.

AS AN old hand at handling a kicker, I cocked an eager ear when told that the Johnson people were bringing out a beefy pair of "sound-dampened" outboard motors this fall.

Naturally I had heard about their first quiet motor, a 5½-horsepower model introduced last year, but I had never happened to hear the motor itself. So when I learned that Johnson now had 10- and 25-horsepower models on the way that were also designed to be quiet, I got curious enough to trek up to Waukegan, Ill., and find out what the world's biggest outboard-motor maker was up to.

On a calm slip out back of the Johnson mill, which sprawls beside Lake Michigan, I first tried out a 1954-vintage Model 25, for comparison's sake.

Not bad, I thought. The motor was not too noisy. But I did have to shout to the crew on the dock as I started, and the vibration was chattering my teeth in bright, hot sunlight as I whipped through a few fast turns and straight runs.

Sea-Horses Are Shushed

Back at the dock, I changed boats and stepped into another world—a 16-foot runabout fired by a quiet 1955 Johnson with 25 horses and electric starting.

WILBUR SHAW, *president of the Indianapolis Speedway, is an enthusiast about boats as well as cars. Whether you own an outboard or not, we think you will find his impressions of a new outboard motor interesting to read.*
—The Editors.

THE DRIVER'S SEAT:

Hushed New Outboards

Everything was remote-controlled. Just ahead and to the right of the pilot wheel was a small panel with starter and choke buttons. Hard right, beneath the gunwales, were the throttle lever and shift lever, which has forward, neutral and reverse positions.

That back-up business, incidentally, is my favorite. What could be cooler, I ask you, than easing into the pier stern first?

At a touch of the button the motor started and revved up. As I eased the shift lever into forward, we leaped away like a scared porpoise. A half-dozen runs on the slip, and I knew I had to take this baby out onto the lake.

Down the slip we went, and hardly a sound was audible but the slap of water against the hull. The engine hums, naturally, but you can carry on conversation at normal tones. As for vibration, there wasn't enough to rattle a coffee cup.

The real noise about this motor will be the applause of people on the bank.

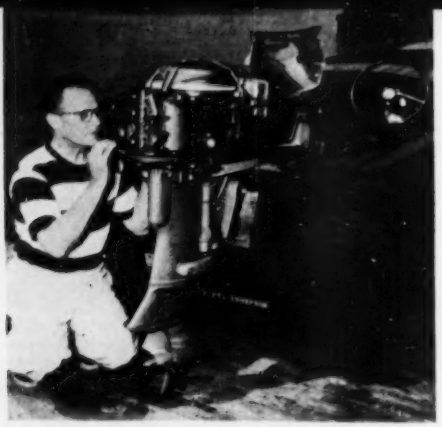
I wanted to see what rough water—lots of it—splashed over the motor and controls would do. Almost all outboards are used in smaller bodies of water or ocean bays and harbors. Choppiness is a characteristic of water in all these places, and it's rough on hulls and engines.

We hit open water at about 25 miles an hour and whomped over a couple of big rollers. Farther out was some deep-troughed stuff, looking sort of gray between waves and frothy on top.

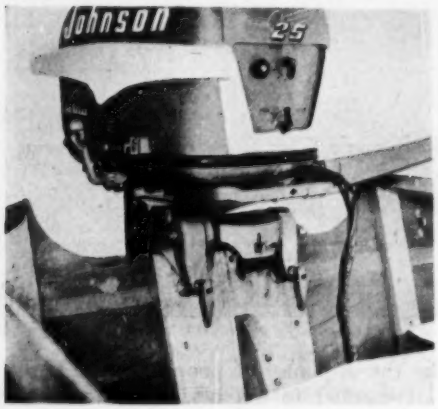
Opening up until we hit at least 30, I headed for it and hit at full throttle. There was no thud, no slap up the spine. We were airborne!

Free Bath

Maybe 20 or 25 feet farther on, we came down. Then I got my test. We plowed into a big stack of water, and everything was drenched: motor, control



A RUBBER GROMMET, under my right fingers, seals the Sea-Horse 25's power head. Motor, gears and exhaust tube are suspended on five rubber mounts as a single, isolated unit.



RUBBER TILTING BLOCK, between clamps, takes the jolt whenever the propeller or the exhaust tube hits an underwater obstacle, flipping the motor back against the transom of the boat.

cables, six-volt automotive battery, starter-solenoid case—and me.

After nearly an hour of this, though, we were still as agile as that porpoise and quiet as any sea horse should be.

Back at the dock, the "why" of all this quietness was made clear when we took a look at the craft's motor.

In the first place, Johnson doesn't talk about making a *silent* motor. Silence, its engineers say, is a mighty positive word, meaning absolutely no sound.

Johnson's 1955 products aren't soundless any more than the family auto, but, compared to old-style outboard buzz bombs, they're as gentle as a breeze.

Some time back, Johnson engineers learned that the biggest part of outboard noise comes through the boat hull, not directly from the motor itself.

Like the hollow shell it is, the hull acts like the sounding board, or belly, of a fiddle. Taking noise and vibration from the motor clamped against its transom, it reverberates sympathetically and broadcasts the noise for miles.

On these new engines, power head, exhaust tube and gear case are suspended as a unit and isolated from the hull by several rubber-cushion suspension points.

Technicians at the big outboard firm didn't stop at floating the drive, though.

Designers Took Sound Under Water

In years past, before the role of boat hulls as sounding boards was understood, attempts at cutting outboard racket centered around engine muffling. The earliest approach was silencing the exhaust outlet by getting it under water.

Johnson learned much about power suspension during World War II, when the armed forces needed quiet outboards for landing and fording craft. But those models were so bulky that they were useless for the vacation trade.

Since then, dampening improvements have been made in toning down engine noise by installing air-intake silencers and quieter gears, and by sealing the engine under an insulated hood.

All these approaches were taken in putting together the new 10- and 25-horsepower Sea-Horses.

A hefty rubber grommet makes a sealed contact all the way around the bite between engine underpan and hinged hood, keeping in high-frequency noises.

Further choking off of these high-level sounds on the big 25 is done by a two-stage air-intake silencer. A similar but smaller chamber does the same for the 10.

Finally, exhaust silencing, by now tuned to a fine pitch, helps to hush the put-put and stifle the roar.

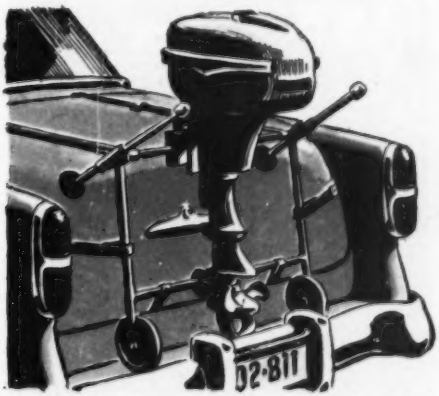
At low speeds, an exhaust relief silencer muffles the engine. At higher speeds the two largest 1955 Johnsons automatically ease over from silencer to underwater exhaust. END

New Ideas

FROM THE INVENTORS

1 Back-Up Seat to Slide Out. The driver of a truck or semi-trailer often has to guess his way back to a curb or loading platform. With this rig, however, he could get a safe, unobstructed rear view past the jutting cargo section while remaining seated and in full control of the wheel and pedals. He'd slide the seat outward by operating a hydraulic drive. Closing the cab door would automatically shift the seat back in.

2 Sleeve to Keep Laces Tied. Children's shoelaces would be less likely to tangle or come untied if the knots were kept bottled up in these plastic cylinders. The knot retainer would safeguard toddlers by preventing loose laces from tripping them; it would also protect adult fingernails by keeping knots from being drawn too tight.



3 Deck Frame to Carry Outboard. Adjustable straps and a tubular metal frame would allow you to mount an outboard motor in an upright, leakproof position on the rear deck of your car. This outfit would put most of the weight on the bumper. Part of the frame could be detached and used as a roller cart or storage stand.

Please turn the page for more new ideas.

MORE New Ideas from the Inventors

4 Pry to Open and Vent Can. A single pass of this opener would punch the two holes you need to pour liquid smoothly from a can. It would have a regular prong for piercing a triangular spout at the rim, and a second point that would vent the can as shown. The extended prong would form a thumb rest, make it easier to apply pressure.

5 Program Page to Form Visor. If bright sunlight or night-game floodlights bother your eyes, you'd probably be glad to find this tear-out insert in a sports program. The heavy-paper centerfold would be perforated so you could pull out a preformed eyeshade complete with slotted arms designed as an interlocking, adjustable headband.

6 Film Winder to Change Bulbs. You'd hardly have to pause between flash exposures if your camera changed bulbs for you. The sockets in these multiple-bulb holders would be wired separately. The fast-acting film advance would cock the shutter and switch in the next bulb, thus reducing the set-up time between shots.

7 Brake to Stop Driverless Car. This automatic roll preventer would protect an auto against faulty parking brakes or a driver's failure to set them. When the car was in neutral and the front seat unoccupied, a spring mechanism would lock the drive shaft. Neither gravity nor the nudge of another car could make this one move.

8 Lighter to Hold Ashes. You couldn't be caught with a burning cigarette and no place to put the ashes if you carried an ash tray in your lighter. The outer sleeve of this windproof-type device would slide upward to make space for an ash receiver in the cap. Raising the sleeve would cause a hinged flap to close flint-and-wick section.

9 Signal to Watch the Pot. It's usually difficult to scald milk and similar foods yet keep them from boiling. When heated to a preset temperature, a bimetal strip in this clip-on, thermostatic pot watcher would spring upward and sound a gong.

10 Chute to Slow Itself. To make parachute descents faster and landings more comfortable, this inventor would hem in the base of the canopy. To slow the chute as it neared the earth, a probe or auxiliary rip cord would open it fully.

U.S. patents on these inventions have been granted to: 1. C. Walsh, Nashua, Iowa; 2. A. Cataldi, Nutley, N. J.; 3. E. Kelly, Seattle; 4. R. Robinson, Wauwatosa, Wis.; 5. J. Rozzi, San Jose, Calif.; 6. T. Knight, Grosse Point Woods, Mich.; 7. E. Brown, Towson, Md.; 8. W. Jaap, Cincinnati; 9. L. and A. Simmons, and H. Arnots, N.S.W., Australia; 10. A. Muther, Zurich, Switzerland.

One Step Finishes Walls In Houses Of Solid Wood

FROM Maine and California come strikingly different twists to an old idea—solid-wood walls. The big advantage is timesaving. Ordinary walls contain several different components, individually installed; some support weight, some keep weather out, some are purely decorative. In the houses shown here, the walls consist of just wood, which supports weight, seals out weather and provides a decorative finish. One building operation does the whole job.

California House Is

VERTICAL SLABS for the walls of this custom-built contemporary house were made by nailing and gluing random lengths of two-by-fours. Ragged ends were later cut off square with a single pass of a power saw.

Maine House Uses Whole Tree Trunks

WHITE-CEDAR LOGS, which have a tough, weather-resisting outer surface and a soft inner core said to possess high insulating value, form everything but the roof for this log-cabin house. The double roof, made of boards, insulation and shingles, is supported by long, foot-thick logs notched into end gables. This house, one of several styles available in precut packages from Ward Cabin Co., Presque Isle, Maine, was put up by John P. Rowins in Bridgeport, Conn.

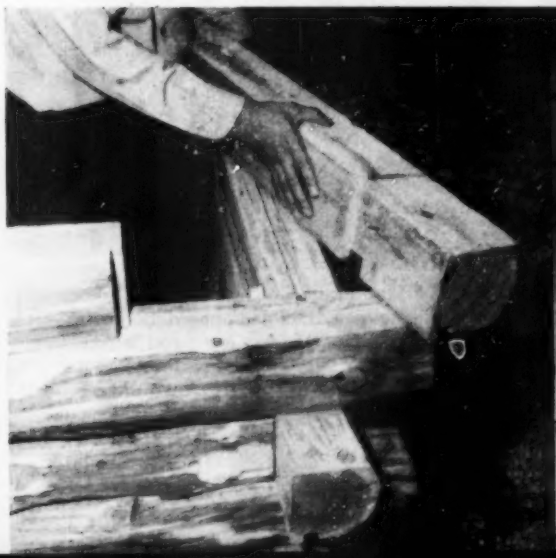
Made of Planks Stacked Like Bricks

OVERHANGING SECOND FLOOR AND ROOF form carport in unusual home near Laguna, Calif. Floors, roof, even windbreaks on porch, were laminated from planks, like walls. Inside, roof became ceiling, floors were polished to look like hardwood, and walls were left natural—all without further finishing. That's owner-designer Harald H. zurNieden perching on his porch rail.

Notched to Fit Like Logs for a Cabin

INTERLOCKING LOGS have tongue-and-groove joints along edges, mortise-and-tenon joints at corners, so they fit tightly together without nails. Calking is placed between logs during construction to seal out moisture and wind.

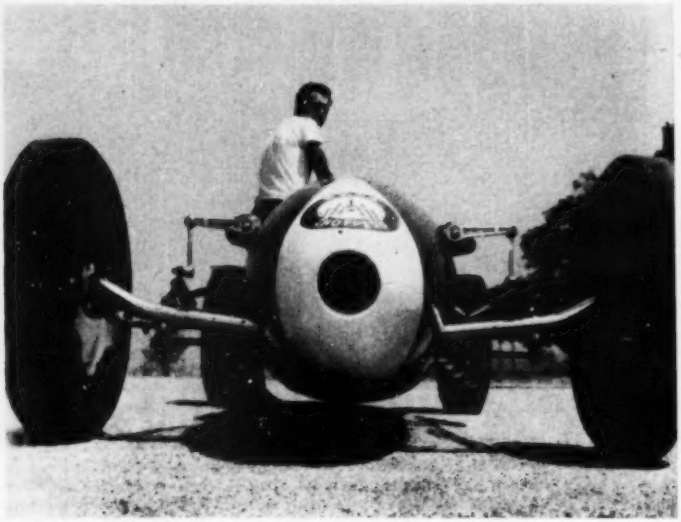
INSIDE OF WALLS looks like rustic wood paneling, requires no finishing. Room partitions are made the same way, but of thinner logs planed flat on both sides. The high ceiling is simply the underside of the roof.



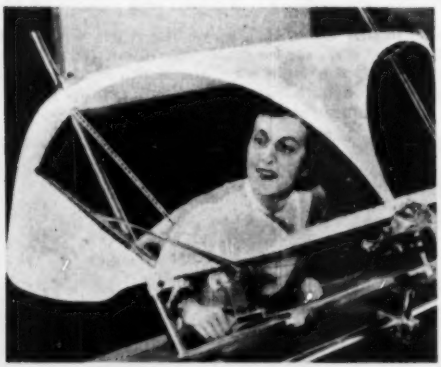
Draggin' Wagon Tops 147 in ¼-Mile

CLEAN-SWEEPING LINES help car attain high speed fast. Club members designed chassis and body, put 1,700-pound beauty together with their own hands and $4,000 from treasury. Chuck Griffith drove the car during its record-making quarter-mile run.

If you think your old family bus does well at the stoplights, take a look at this little getaway champ. It reached a speed of more than 147 m.p.h., after a rolling start, in the standard drag-strip run of a quarter-mile. The $4,000 bright-red dragster was designed and built for these brief races by members of the Pomona (Calif.) Choppers, police-sponsored hot-rod group.

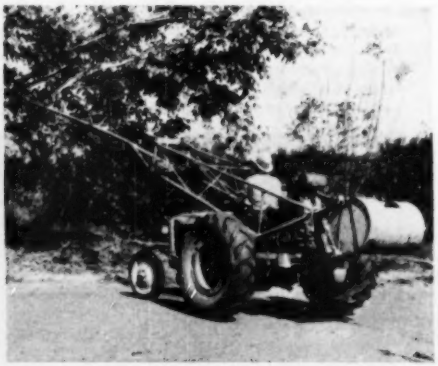


CHAMPIONSHIP DRAGSTER stands 42 inches high, is 180 inches long on a 116-inch wheelbase. Hole in nose admits cooling air to engine compartment. Upper half of nose was cut from an airplane drop tank. Rest of body was free-formed by club members.



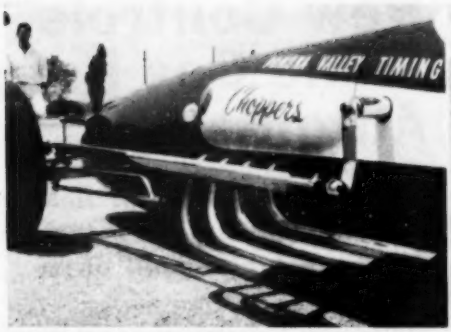
Windshield Wiper Turns Corners

Wiper engineers have caught up to windshield engineers again with a new design that turns the sharp corners of wrap-around windshields. The dotted line (above) shows the extra glass cleaned. Anderson Co., 1075 Grant, Gary, Ind., is the maker.

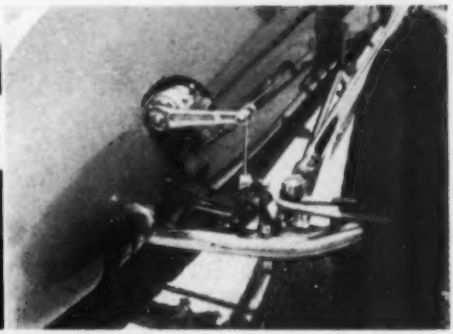


Tree Shaker Speeds Harvest

Allen Turner of Kingsburg, Calif., harvests nuts with a tractor-mounted boom—a long pipe through which a loose rod is run. Hooked to a limb, it shakes down nuts as it is yanked back and forth by its own engine mounted at the rear of the tractor.

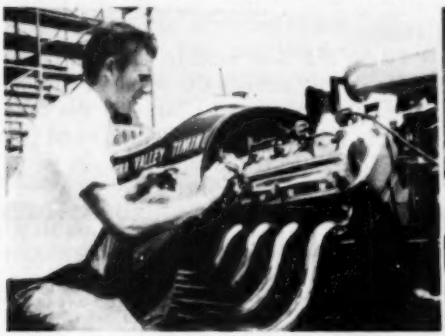


CHROMED EXHAUST PIPES add power as well as looks. Airplane-strut tubing reinforces drag link.

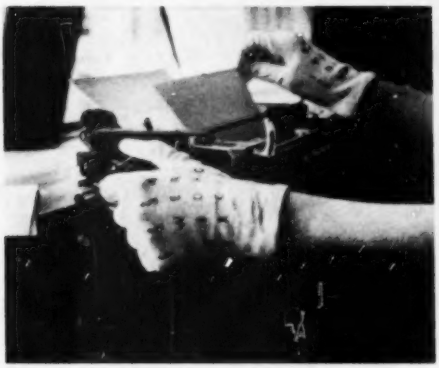


FRONT-END ASSEMBLY of the car includes handmade tubular axle, Ford spindles and hubs.

REWORKED ENGINE, a Chrysler FirePower V-8, delivers 425 hp. Transmission is '40 Lincoln.



STEERING GEAR robbed from an old Franklin links to arm which is arc-weld reinforced.



Gloves Teach Touch Typing

A BEGINNER at the typewriter can't forget what finger goes where if he wears these gloves—the keyboard is printed on their backs. For more speed, the finger tips can be clipped off. The Adams Educator Co., 1133 Broadway, NYC, is the maker.

Pocket Fan Runs on Batteries

THIS little mechanical pinwheel will give you breezes wherever you go. Small enough to fit in your pocket, it is powered by three flashlight batteries that can spin the blades for eight hours. Dux Toys, Ludenscheid, West Germany, makes it.

New Controls Make Gas Range Automatic

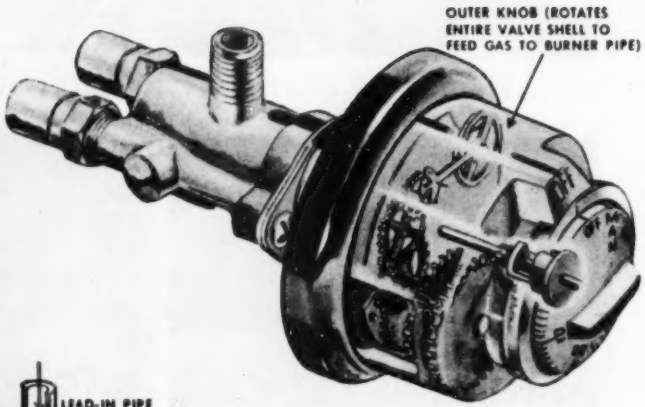
An ingenious inventor licks a 25-year problem with principle taught in high-school physics.

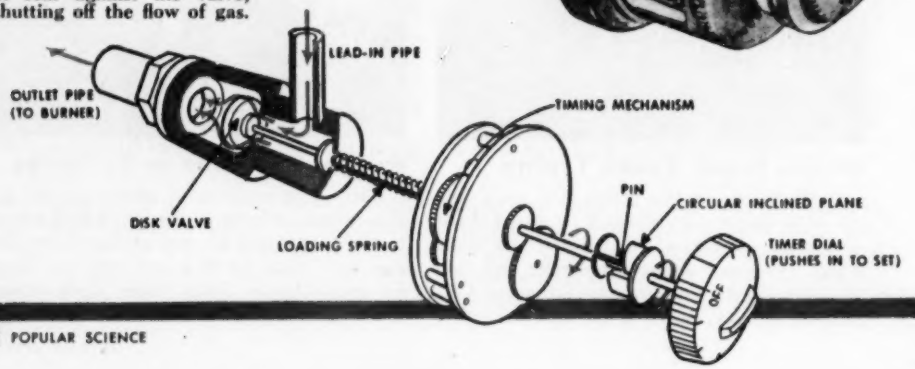
THE application of an age-old principle of physics—the theory of the inclined plane—will make it possible this fall, for the first time, to buy a gas range that is fitted with a reliable mechanical timer.

With the new built-in timer, a housewife simply adjusts the flame or thermostat to the required heat, sets the timer (part of the same control knob) and goes off. The controls will automatically switch

HOW IT WORKS

BY USING A SPRING as the actuating force on his inclined-plane mechanism, inventor Clarence Wantz could put to work the flea power of a tiny timer. Upper sketch shows the complete device. In lower sketch, spring power and friction of pin against circular inclined plane are exactly balanced until timer, set by housewife, supplies slight push. Then pin rides slope until it pops into slot. This forward motion pulls the disk at rear against the valve, shutting off the flow of gas.





off the gas at whatever time she desires.

The inclined-plane mechanism represents the successful conclusion of a 25-year search by gas-range manufacturers for an inexpensive, compact mechanical timer. Most previous devices failed because they required the timer to shut off the gas, and small timers just don't pack the muscle to do much more than tick off the seconds.

Clarence Wantz, inventor of a variety of automatic controls, came up with the answer by digging 'way back into his high-school physics. His design: a spring-loaded device triggered by a metal pin that rides a small inclined plane. The timer supplies only a nudge; the spring does the work.

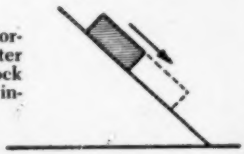
Produced by the Robertshaw-Fulton Controls Co., the new timers are called the Potwatcher (for top burners) and Temp 'n Time (which combines a thermostat with the new timer, for ovens).—*George H. Waltz Jr.*

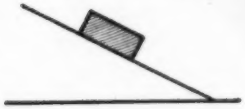
PRINCIPLE OF THE INCLINED PLANE

WHEN THE RETARDING EFFECT of friction on an object is exactly equal to a force that wants to move it, the object remains in equilibrium. But once in that state, the slightest shove will be sufficient to set it in motion. That is what happens inside the new stove timer.

SLOPE TOO EASY: Forward force can't overcome friction. Block remains stationary even if given nudge.

SLOPE TOO STEEP: Forward force is greater than friction and block slides freely down inclined plane.

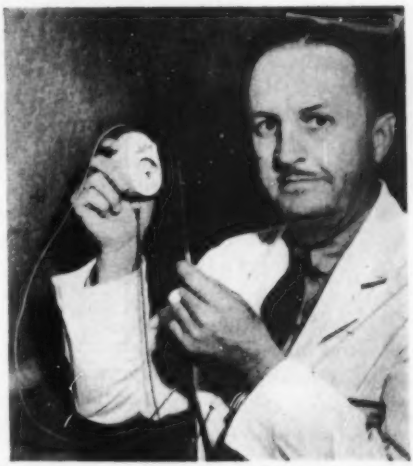




SLOPE JUST RIGHT: Forward force and friction are exactly balanced. Slightest nudge will move block down plane.

Gendarme Takes to Airwaves

THIS Paris gendarme gets his orders by means of a two-way radio, and at the same time gives his superiors an on-the-scene picture of what's going on. The set first proved its value during an outbreak of political rioting.



Thermometer Is Fast Worker

AN ELECTRONIC thermometer that will take a patient's temperature in five to seven seconds has been invented by an Army dentist, Col. George T. Perkins. It is said to be the first new development in clinical thermometers since 1867.

Gus Tricks a Truck

By Martin Bunn

Gus felt a moment of stunned horror, and then he was running towards the house at top speed. There was no telling how badly Steve was injured.

A man's life hung in the balance. Could Gus save him by double-crossing a stubborn truck?

IT WAS one of those windy, early-fall days. As Gus Wilson and his helper, Stan Hicks, drove out into the countryside, Gus gratefully inhaled gusts of tangy autumn air.

"On this call," he told Stan, "we'll kill two birds with one stone. You drop me off at Ezra Hendricks' place, and then go up to the Big Hill and pick up that motor for repair. That'll take you a couple of hours. I'll be ready to go by the time you get back."

"Fine!" Stan exclaimed. "This is one trip I'll enjoy."

A few minutes previously, Mrs. Ezra Hendricks had driven into the Model Garage to tell Gus that her husband was hauling corn in to fill his silo, and that their truck was stalled. Ezra had been trying to phone Gus, she said, but the rural telephone was out of order.

"What seemed to be the trouble with the truck?" Gus had asked.

"I don't know," Mrs. Hendricks had told him, "but Ezra told me that Pete Blinstock was raising so much dust that he couldn't even see the truck."

Idle Hands Cost Money

Driving into Ezra's yard, Gus waved to Will Shepard and Steve Overhart, working with a small tractor and a silage cutter on a fast-disappearing pile of corn.

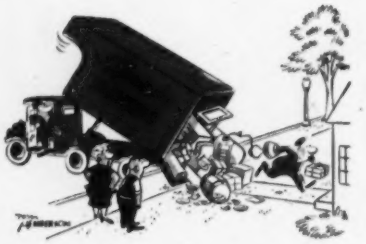
"No wonder Ezra is frothing at the mouth," Gus told Stan. "Shepard and Overhart charge by the hour. If Ezra doesn't keep the corn coming to them, it will cost him while they stand idle."

The stalled truck, half loaded with corn shocks, stood at the edge of a field near the house. Beside it stood Tom Hanratty, another close neighbor of

Ezra's, pitchfork in hand. Ezra himself was leaning over the line fence, his gray beard trembling with indignation as he shook his fist at Pete Blinstock. Blinstock was preparing his field for the planting of winter wheat, just across the fence line, pulling a four-section drag with a crawler tractor. A curtain of dust rose behind him.

"Quit it, you lump-jawed old gopher," Ezra yelled at Blinstock as Gus pulled up, swung out his tool kit and sent Stan on to Big Hill to pick up the motor.

The insults that passed between the two old gents might have fooled a stranger. But Gus knew they were warm friends who enjoyed needling each other unmercifully. Blinstock would not stop throwing dust as long as he got a rise out of Ezra.



"Who'dja say recommended this outfit?"

"Some day," Ezra declared, coming over to the truck, "I'll grab Blinstock's nose and twist his head until he looks over his back."

"That," Tom Hanratty chuckled, "I would like to see."

Gus climbed into the truck, turned on the switch, pumped the throttle vigorously and stepped on the starter. The motor came to life, ran smoothly and then began to lose power with a hollow sound. Gus guessed that it had gas trouble, but he leaped out of the truck again to run a neon-tubed screwdriver over the spark plugs before the motor could die completely.

Air Cleaner Is Missing

Brilliant flashes in the screwdriver handle told him that there was little chance of ignition trouble. Carburetor or pump, he decided, unless Ezra was out of gas.

Even as this occurred to Gus, he noticed that the air cleaner was missing from the top of the carburetor. Gus frowned. It would be just like Ezra to throw the cleaner away in a fit of anger.

Gus peered into the throat of the carburetor, flashing his pencil light, working the throttle rapidly. He saw a tiny, thin jet of gas squirt from the injector nozzle. The stream angled off to the side, as though passing through a partly blocked nozzle. That carburetor had more dirt and sand and corn-husk shred in it than gas, Gus thought. He'd have to take it down and clean it out.

At that moment Will Shepard came tearing through the cornfield on a dead run, his features twisted with panic.

"Quick!" he yelled. "Steve got slammed by the tractor belt. He's out cold."

Gus felt a moment of stunned horror, and then he was running towards the house at top speed.

Arriving on the scene, he found Steve Overhart unconscious on the ground. Shepard was dashing cold water in his face with no effect. There was no telling how badly he was injured—likely, Gus figured, concussion.

"Quick, Ezra!" he gasped. "Get out your car."

"My car!" Ezra echoed. "Ma still has it in town."

"Get any car!" Gus snapped. "Hanratty—Shepard—your cars?"

"We rode the tractor over," Shepard choked out. "There is no car."

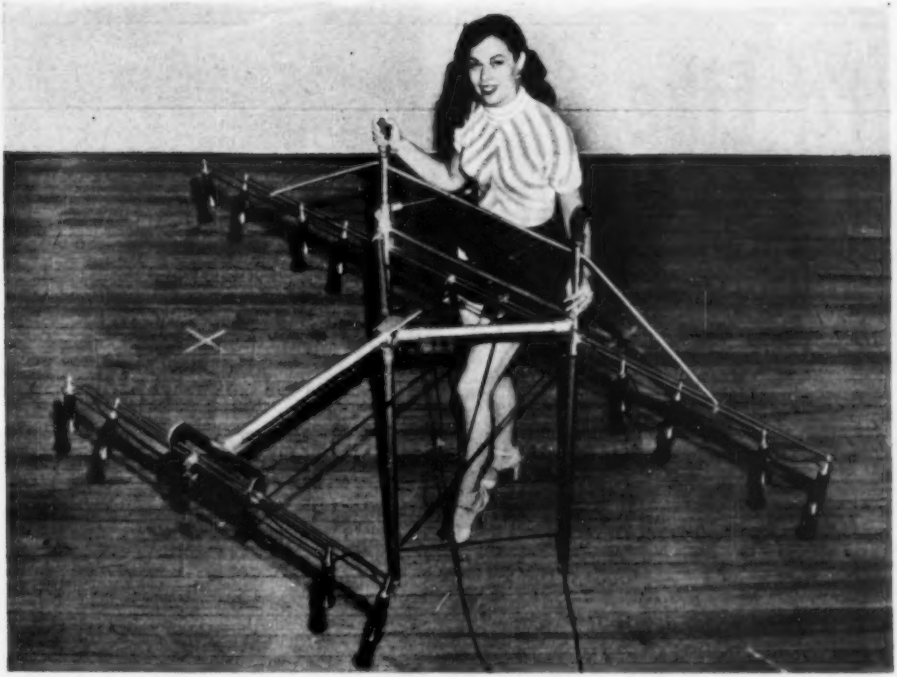
Gus's mind chewed on the problem. Telephone out and no car on the premises. Blinstock's old car was seldom used, often had a dead battery or flat tire or both. Steve lay back now, in a state of shock. The man might die if he didn't get medical care quickly.

"Stay with him, Hanratty," Gus said, and ran toward the truck.

Gus jumped into the cab, pumped the throttle, stepped on the starter. The motor came to life as before, then died.

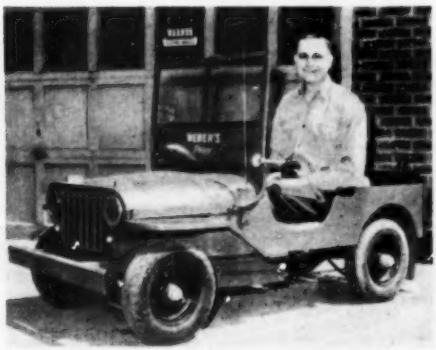
"That's the way she's been acting,"

[*Continued on page 248*]



Mechanical Partner Helps Teach Beginners How to Dance

WITH this mechanical partner, a dancing instructor can coach as many as 12 students at once. As the aluminum tripod is moved along, a pattern of lights is flashed onto the floor by lamps strung along the cross-arms and controlled by rods attached to the teacher's feet. Students follow the beams. R. Holcombe, Shawnee, Okla., invented it.



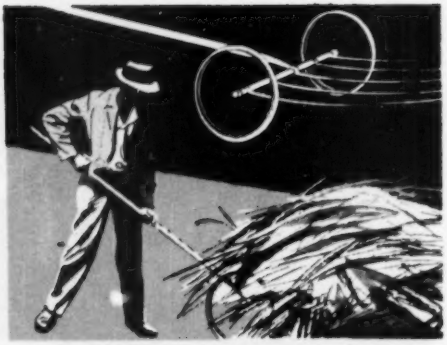
A Gallon Takes Him 60 Miles

CHARLES A. WEBER, a car mechanic of Elkhart, Ind., may need a shoehorn to get into his baby jeep, but once in, he can buzz along at 35 m.p.h. A one-cylinder scooter motor mounted over the rear wheels with a chain drive supplies power.

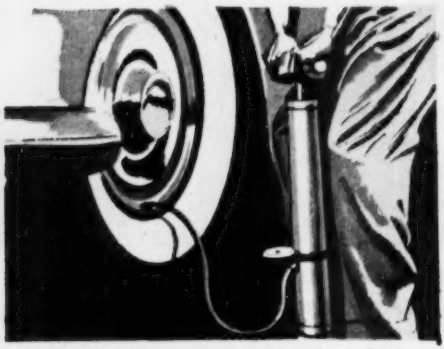
Bakery Bakes as It Rolls

A BUS rolling around Minneapolis sells baked goods still hot from the oven. While the route man drives, a baker in the rear turns out doughnuts and rolls from a fryer and an oven heated by bottled gas. The McGlynn Bakeries run the traveling kitchen.

I'd Like to see them make...



A LARGE PITCHFORK WITH WHEELS so you could push the fork under a large pile of brush, sticks or leaves, and roll away the debris.—*Andrew Silinsh, Gaithersburg, Md.*



AN AUTOMOBILE TIRE PUMP with a built-in gauge so you could get an air-pressure reading without removing the pump from the tire. —*Stefan Mikulski, Milton, Mass.*

PUTTY IN PLASTIC BAGS so the oil could be worked into it by kneading it. This would eliminate messy mixing and scraping in a small can. —*S. J. Ziemba Jr., Utica, N.Y.*

CHAIR-RUNG PROTECTORS. Shaped strips of rubber or plastic to snap over the rungs would keep the wood free of scuffs from children's feet.—*M. M. Monahan, Washington, D. C.*

PORTABLE, PLASTIC DUCK BLINDS that would open out to fit over a rowboat and fold into a small package for easy carrying and storing. —*David Hart, Mission, Kan.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by *Popular Science Monthly* readers. What is *yours?* We will pay $5 for each one published. Please use government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.

I let the finishing touches on the speaker cabinet slide until I had enjoyed my first concert.

How to Pick Out a Hi-Fi System

One record that came to life made a fan of this beginner. Here he tells other beginners how to start the hobby, too.

By Wesley S. Griswold
PSM PHOTOS BY HUBERT LUCKETT

UNTIL the other evening, I had cozily believed that I owned a fine phonograph. That night, at a friend's house and in the space of a few minutes, I found out that what I owned was merely a nice-looking piece of furniture. One of my own records told me so.

My host, who had built himself a high-fidelity sound-reproducing system (don't let a fan hear you call it a "set") years before the nickname "hi-fi" entered the language, had asked me to bring along

A thrilling introduction to hi-fi was followed by confusion

LISTENING AND LEARNING, I sampled many hi-fi systems in the showroom of Asco Sound Corp., NYC. The control board hooked up any combination of components that I wanted to hear.

BUT I WAS DUBIOUS of the outlook when my purchases arrived home and I sat in a nest of electronic equipment, cut lumber, and tools. My old phonograph and player are at my right.

two or three of my newest long-playing records.

I had. Five minutes after he put the first one on his record player, I was a hi-fi fan myself. What an ear-opener!

The singers who had previously been struggling with mouthfuls of teeth suddenly were articulate.

The bass-drum notes that had formerly sounded rather like the plucking of heavy rubber bands now had depth and authority and character.

When a violinist or a trumpet player or an oboist took a solo passage, I had the sensation that an invisible figure had stepped out of the speaker cabinet and begun to play in the living room.

And there were sounds that I had never heard emerge from that record before—the soft whir of distant snare drums; crisp, shimmering cymbal clashes; bell-like tones from a triangle that had been drowned in my phonograph.

"Boy!" I exclaimed. "How I would love to be able to afford a set—excuse me, system—like this!"

"And how much do you think it would cost you?" my host asked, with a superior smile.

"Oh, about 600 bucks," I guessed.

"If you'll put it together yourself," he said, carefully emphasizing the words, "you can get a system that'll sound better than a $600 commercial outfit but won't cost you over $200."

"You think I could do the work?" I asked.

"*Anybody* could do it," he said.

I mentally leafed through my checkbook, figured that I might just possibly afford to spend $200 for such a musical treasure, and asked where I could buy the necessary equipment. My host recommended a hi-fi salesroom located in midtown New York.

Hi-Fi's Inner Sanctum

Two days later, we went there together. It was a long, carpeted room, three stories above the street. At one end of the room stood a number of speaker enclosures. They were of several shapes and sizes and kinds of wood.

Along the wall opposite the entrance door were banked several rows of rectangular cabinets. Most of these, I learned, contained amplifiers. The bottom row held record players.

With detailed instructions, however, I couldn't go wrong

GLUE AND SCREW, GLUE AND SCREW—so it went for hours as I assembled the speaker enclosure. It had to be as nearly airtight as possible to prevent buzzes when the wood shrinks.

I MADE ROOM for the new record player inside my phonograph cabinet after taking the old turntable out. The paper template at my right hand showed me where to enlarge the hole.

An elaborate control board enabled a demonstrator to hook up any speaker-amplifier-player combination I wanted to hear.

My friend quickly mapped out a procedure that proved to be ideal. I enthusiastically recommend it to all other beginners.

"Start with the speaker," he said. "Tell the man you want to hear any moderately priced speaker."

I did. The salesman flipped a switch, and a gush of familiar sound poured out of an enclosure in a far corner.

"Hey!" I exclaimed. "This will be a dandy test. I own that record. I know every note on it."

After two or three minutes, I asked the salesman to switch on another speaker, and to keep doing so until I had heard several. As the sound burst at me from points scattered across the entire end of the room, I kept score on the various speakers with a note pad.

Parts Cost Under $200

Speaker	$26.46
Amplifier	69.50
Record player	40.40
Magnetic pickup	22.90
Wood for speaker enclosure	22.78
Screws, glue, sandpaper, grille cloth, insulating material, etc.	13.88
	$195.92

Speakers Have Ups and Downs

All were impressively better sounding than my own phonograph. However, some seemed shriller than others. A few seemed to overemphasize the bass tones. Some seemed less able than others to separate the instruments and reproduce their characteristic sounds faithfully.

One speaker, out of eight, delighted me. I kept asking the salesman to turn back to it. Through it, the recorded orchestra sounded as well balanced, its tones as pleasingly rounded, as it would have sounded in a concert hall.

"Number three is my favorite," I said. Then, warily, I asked, "How much?"

"Number three was a University Diffusicone," the salesman said. "It costs $26.46."

"That's a break," I

remarked with relief to my friend. "How much might I have spent for a speaker?"

"The most expensive one you listened to this afternoon cost $77.89," the salesman said.

"They run all the way up to $550," my friend said. "But you made an excellent choice—in your price range."

A Good Pickup Is Essential to Hi-Fi

"Well, I'm delighted with it, anyhow," I said. "Now, what next?"

"The pickup cartridge," my friend replied. "But stick to the speaker you have already selected. That choice is frozen."

"The pickup is the part of the tone arm that contains the needle, isn't it?" I asked.

"Stylus," he said.

"I call it a needle," I said.

"Well, don't. Stylus is the proper term."

"Okay, but why choose a pickup cartridge next? Why not an amplifier?"

"Because," my friend said, "next to the speaker, there's no part of your hi-fi system that makes more difference to the sound of records than the pickup."

We tried several, playing over and over again the same, familiar record through the speaker I had chosen. In two or three instances, an invisible veil seemed to be interfering with my hearing clean, well-defined sounds.

My choice narrowed fairly quickly to two. They both sounded fine, but one seemed to have a slight edge in quality.

"What's the difference in price?" I asked the salesman.

He laughed. "The difference between $22.90 and $60."

"That won't be hard to decide," I said. "I'll settle for the cheaper one. What is it?"

"It's a GE magnetic pickup," the salesman told me. "It has a sapphire and a diamond stylus."

"Why two?" I asked.

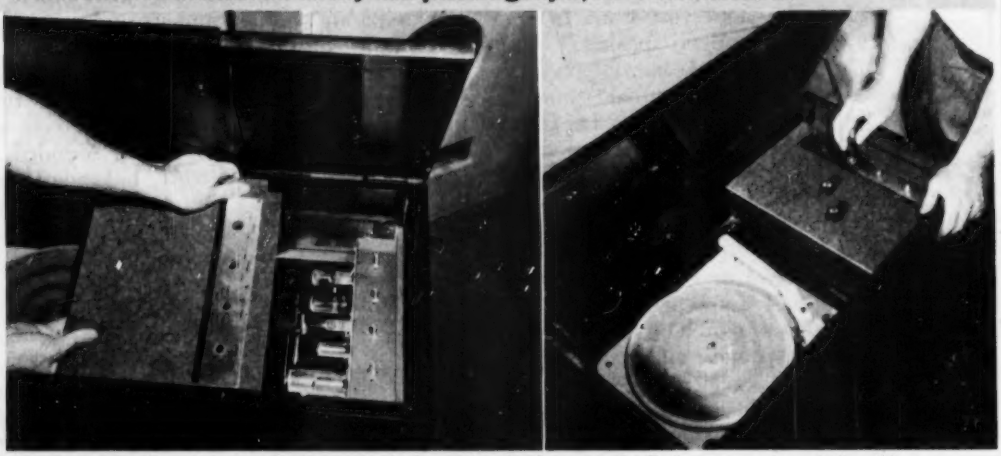
Diamonds Are a Record's Best Friend

"The sapphire is for your 78-r.p.m. records," my friend explained, "and the diamond for long-playing records—both 45 and 33⅓ r.p.m."

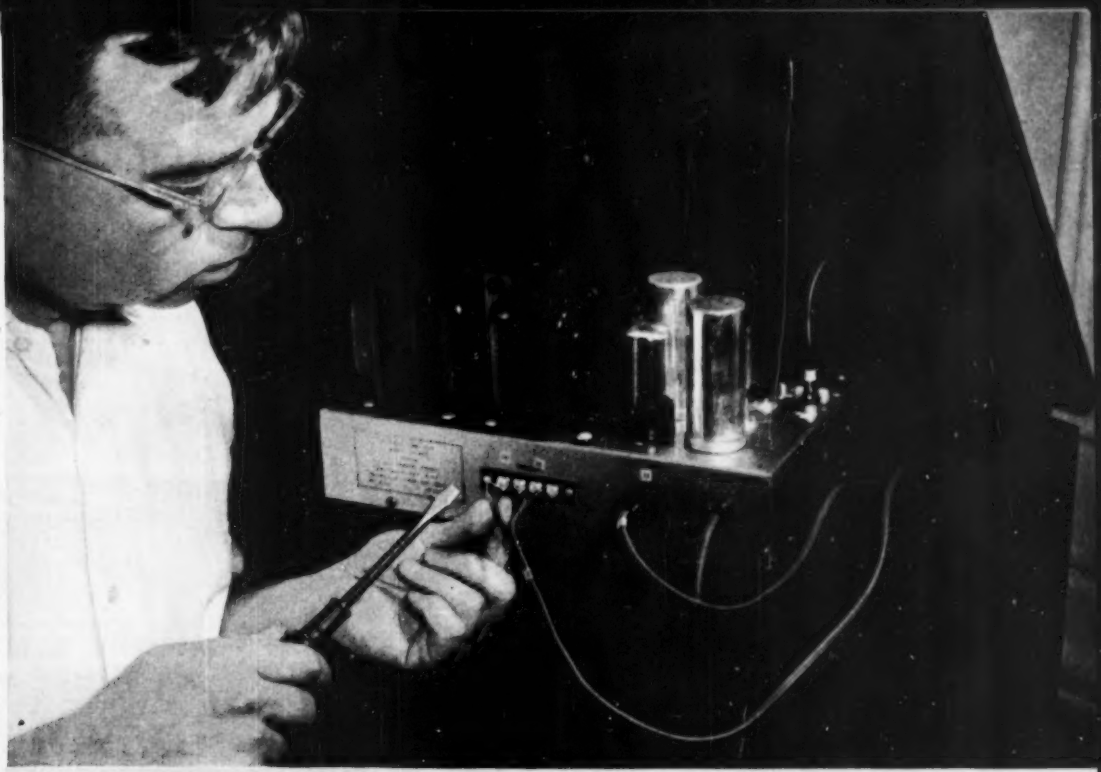
Though the diamond stylus is at least 10 times as expensive as the sapphire, it is far more economical in the long run, I was told, because it lasts so much longer than the other kind. A sapphire is quite adequate for 78-r.p.m. records, however, which I rarely play any more.

For a record player, I chose a new

Out came the innards of my old phonograph; in went the new



WHERE MY RADIO USED TO BE, I mounted the amplifier—vertically, so it would fit the space. I cut its control panel out of hardboard to match the contours of the radio panel. Attaching knobs topped off the conversion of the old phonograph cabinet. Next I am going to adapt an FM table radio of mine so that I can play it through the new amplifier and speaker.



The electrical work was a cinch, thanks to color-coding

UNLESS I WERE COLOR-BLIND, I couldn't have made a mistake hooking up the amplifier to the record player, power source and speaker. Bands of red, orange and white girdled the electrical cords and were matched by patches stuck over the amplifier connections.

Swiss job, called a Lenco. At $40.40, it was not the least expensive one I tried. On the other hand, it was $252.10 cheaper than the most expensive one. Apart from its beautiful construction, it has a special feature that particularly appeals to me. Its three speeds are adjustable. That means that I can make minor changes in the speed—and therefore the pitch—of a record when I want to play along with it on my piano, as I sometimes do.

An amplifier was the last component I picked out for my hi-fi system. We listened to several—hooked up to the Lenco player, the GE pickup and the University speaker. I could hardly detect any difference in sound among most of them. Some did have a lot more knobs and markings on their control panels than others. They merely confused me.

"The thing to remember," my friend said, "is that you want an amplifier that will provide for record compensation."

"Now, what in the world do you mean by that?" I asked.

Caution: Watch Out for Curves

"Until recently, every recording company's engineers had firm but differing ideas about when to boost the treble notes and cut down the bass notes in making a record," he explained. "Those ideas have determined what are called recording curves. Now all the major companies have got together on one curve. However, it applies only to the newest records. You'll still want to play your older records, so you ought to have an amplifier that'll compensate for at least those principal variations."

"I suppose that the more expensive amplifiers give you the widest choice of recording curves," I said.

"Right."

[*Continued on page 256*]

How to Fill Your House with Music

Scatter loudspeakers around the place, in home-built enclosures described here, and just one hi-fi phonograph will do the trick.

By Abraham B. Cohen

Engineering Manager
University Loudspeakers, Inc.

IT IS as old-fashioned to try to feed phonograph or radio music to all parts of your house from one *loud* loudspeaker as it would be to try to heat the homestead with a single pot-bellied stove.

You needn't pepper the place with radio-phonographs, either. Additional loudspeakers will do the trick, in home-built enclosures suited to the speakers and to the locations where you want to put them.

All of the speakers can feed from one high-fidelity radio-phonograph, situated wherever you'd like it to be.

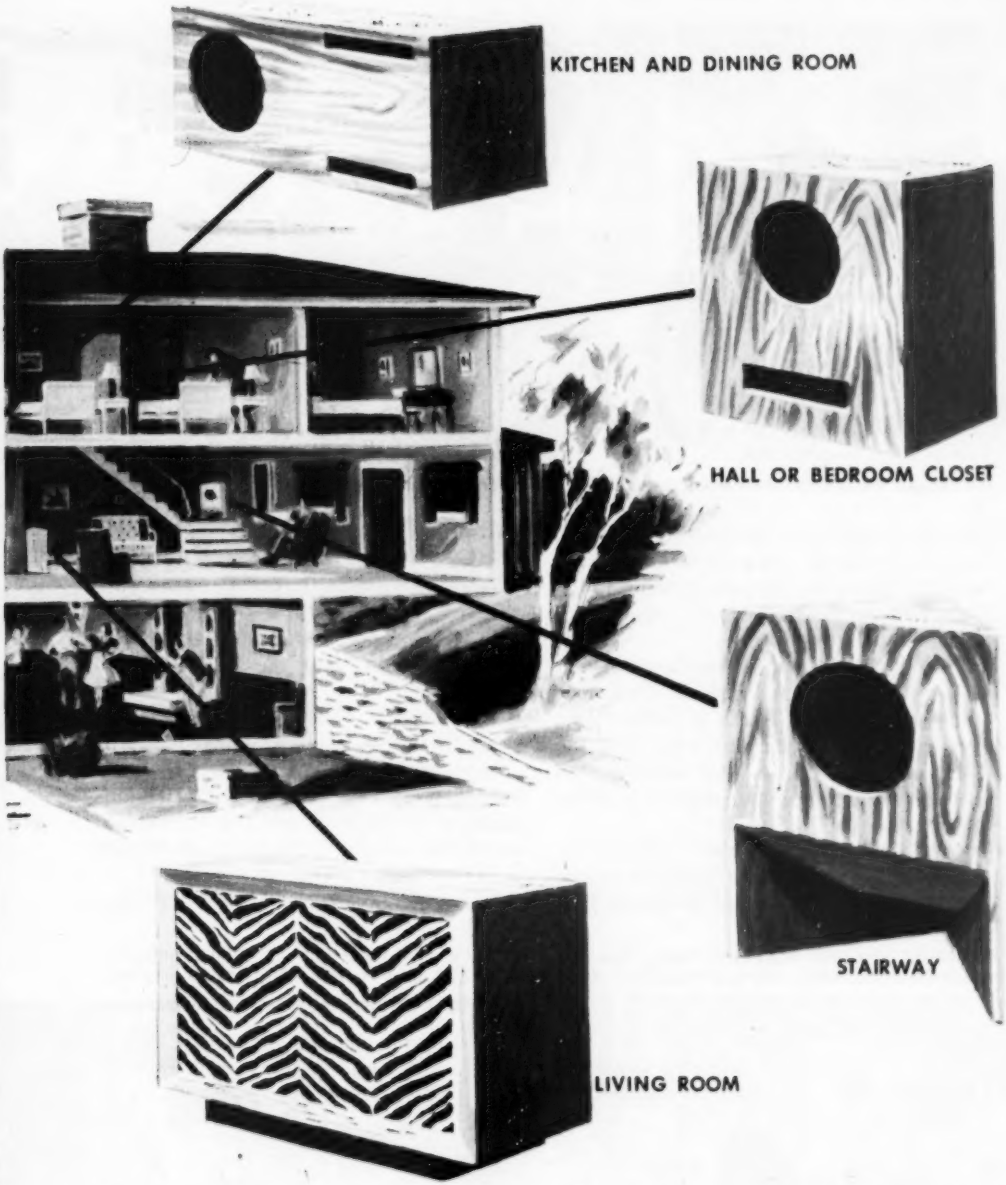
Speaker and Enclosure Must Match

I am going to recommend several speaker-enclosure combinations to you and suggest places to put them. I cannot emphasize too strongly that in every case the speaker and enclosure have been carefully matched acoustically. They have to be. Every loudspeaker has its individual resonance characteristics. So does every enclosure, depending on its design, size, shape and construction. If these two sets of resonance characteristics don't complement each other, your money and workshop labors will have been largely wasted.

For a starter, let's suppose that you have a basement room, fitted up for recreation or as a workshop, where you would like to be able to hear your records or favorite radio programs at their best. Floor space is important to you, so why not locate the speaker in a ceiling corner? There it will be out of everyone's way and nothing will obstruct the path of the music to the listeners' ears.

RUMPUS ROOM

Drawing No. 1 shows you the shape and dimensions of the enclosure best suited for this purpose. Note the triangular opening near the base of it. This is called a port, or vent, and it marks

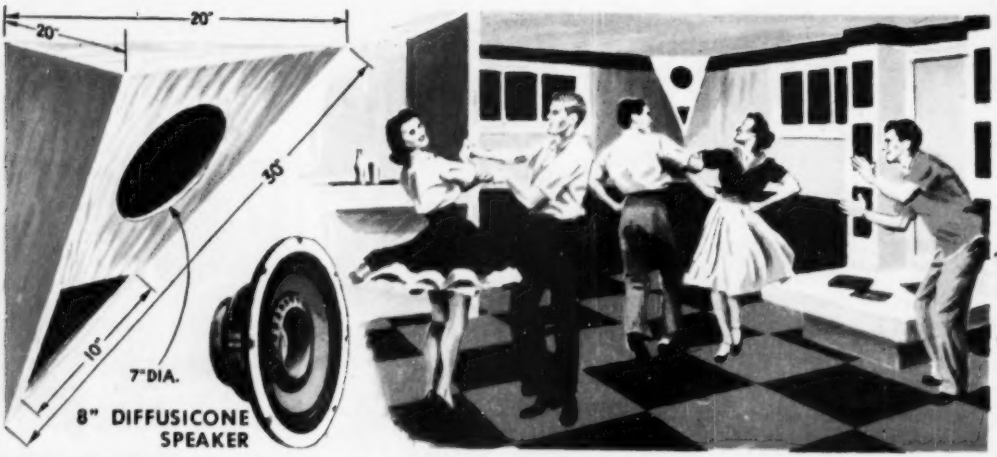


the enclosure as a special type known as a "bass reflex."

In a bass-reflex enclosure, the port acts as a "tuner." Its size and the internal volume of the cabinet together determine the resonance of the enclosure. When properly tuned, a bass-reflex enclosure reduces the boominess of the loudspeaker and makes it possible for the speaker to reproduce lower tones than would otherwise be possible.

The particular enclosure chosen for the ceiling corner in the basement was designed to be the perfect acoustical partner of an eight-inch Diffusicone loudspeaker.

This speaker has a woofer (bass speaker) section and a patented Diffusicone



1. Music from a ceiling-corner speaker will not become muffled as the rumpus room fills up.

action for the high (treble) frequencies, dispersing them over a wide angle. It is ideally suited for providing wide-range sound reproduction from small enclosures.

I suggest this same speaker for another, smaller bass-reflex enclosure, shown in Drawing No. 2. A perfect spot for it, as the drawing indicates, is in the "serve-through" area that divides the kitchen from the dining room in so many modern houses.

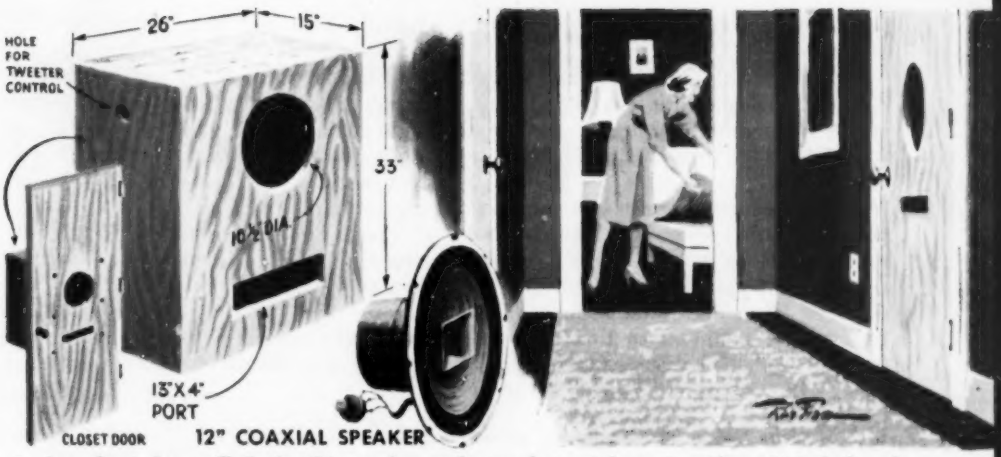
You will note that the enclosure in Drawing No. 2 has two ports, for better equalization of the sound pressures that are built up inside the box by the speaker.

I propose a third bass-reflex enclosure —the biggest of the three—for an upstairs hallway, where, as Drawing No. 3 indicates, it can be hung on the inside of a closet door.

The internal volume of this enclosure is about five cubic feet, which makes it an ideal acoustical companion for an extended-range, 12-inch coaxial loudspeaker. A coaxial speaker is one in which the tweeter is nested in the center of the woofer.

It is an acoustical fact-of-life that

2. OTHER EFFECTIVE PLACES to locate this efficient little bass-reflex speaker enclosure would be on a shelf in a den or library, behind a home bar, or even in the headboard of a bed.



3. Any closet door will do for this speaker enclosure, but reinforce it with a ¾-inch board.

whereas low frequencies disperse and spread quite readily, high frequencies travel in rather straight, tight beams unless a tweeter is designed to spread them. In the particular speaker I have in mind for the upstairs-hallway enclosure, the tweeter is designed to disperse high frequencies at an extremely wide angle. Here, the sound can enter the rooms opening into the hallway.

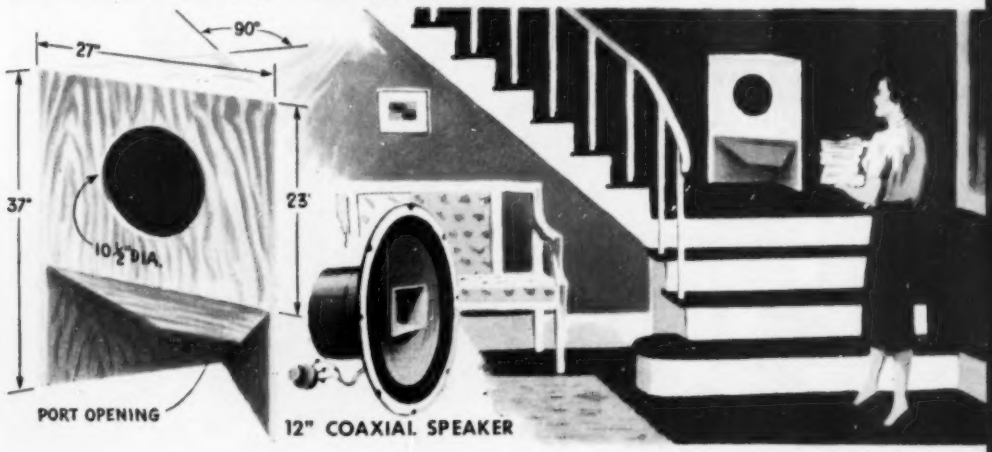
Another fine location for a speaker enclosure is on the landing of a central stairway, as in Drawing No. 4. Here, it will feed sound upstairs and down.

For this strategic corner, I suggest a 12-inch coaxial speaker in a bass-reflex enclosure with a horn-loaded port. "Horn-loaded" simply means that a horn structure or its equivalent has been added to the port. In this particular enclosure, as you can see in the drawing, the port is in the back corner of the structure, facing the floor. Thus the converging walls and the floor serve as a horn for the port.

The advantage of horn-loading a port is that it makes the port a better acoustic radiator for the low frequencies than an unloaded port is.

It is much like the advantage you gain

4. FOR SURPRISING REALISM of sound—a sensation that music is welling up all around you—play this stairway-landing speaker and the big one in the living room at the same time.



in throwing your voice when you use a megaphone.

I have saved the finest and biggest speaker enclosure for the living room, where you would naturally want your high-fidelity system to perform at its very best.

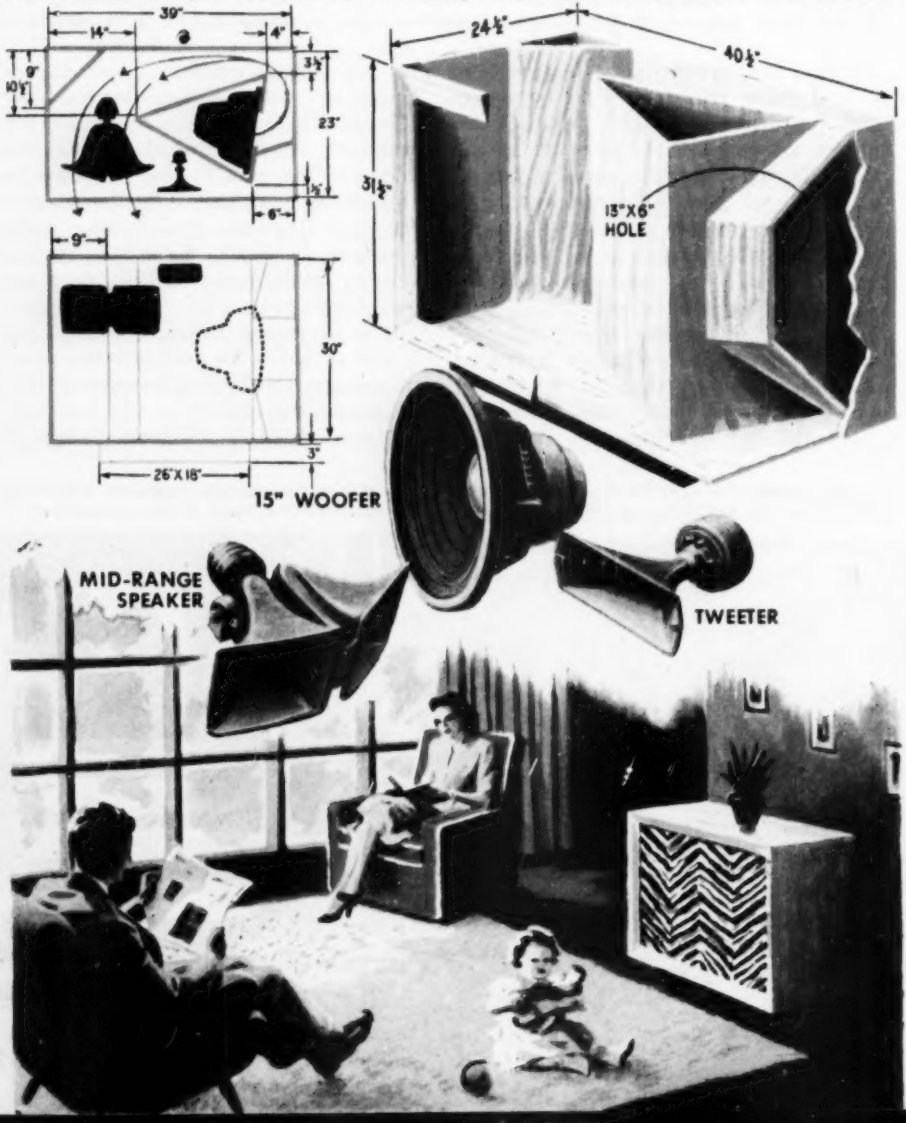
The enclosure shown in Drawing No. 5 contains three speakers: a 15-inch woofer, a middle-range speaker and a tweeter, carefully matched in efficiency and quality. The mid-range speaker and tweeter are mounted so that they face into the room. The woofer faces the right side of the enclosure, pouring its sound into the little end of a long, folded, "exponentially flared" horn.

"Exponentially flared" means that the horn's passage begins with exactly the right diameter and widens at exactly the right rate to make it a scientifically perfect corridor for the sound that is traveling along it.

The horn in the enclosure I am discussing folds, or bends, as it flares. It first curves toward the back of the enclosure and then around toward the front. Its mouth, with the mid-range speaker and the tweeter suspended in it,

[*Continued on page 256*]

5. This elaborate speaker enclosure, outstanding in performance, is actually a folded horn.



Their eager search for truer sounds led these fans to a wide variety of

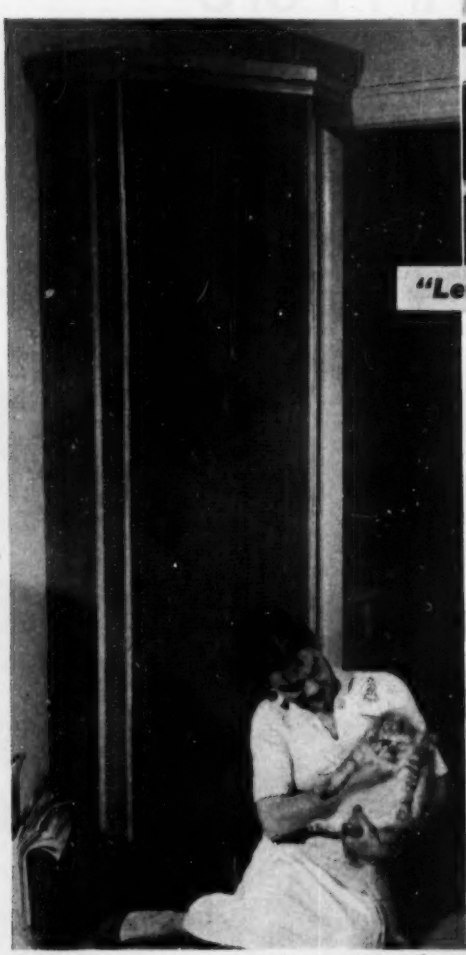
Hi-Fi-ers' Fancies

"THE CONCRETE MONSTER" (below), as its pleased owner, James Ferguson, a Los Angeles tool- and diemaker, calls it, is a huge horn. It rises from a buried oil drum partly filled with big stones and containing a 15-inch bass loudspeaker. Its mouth is part of a dining-room wall.

The other extreme is shown at left, where David Mankovitz, violinist and head of New York City's Audio Club of hi-fi fans, displays one of a pair of easily portable speaker enclosures he made out of cardboard cartons.

Some are simple; others are curiously complex

GEORGE F. VARKONYI (right) is a display manager for a national distillery, but building highly original hi-fi systems is his hobby. His friends declare he's a genius. Varkonyi, seen at the controls of his homemade console, built both speaker enclosures on this page.



"Let George build it," his friends say

FOR LACK OF SPACE in his New York apartment, George Varkonyi was forced to build a tall (7½ feet) and narrow speaker enclosure. In the picture at left, Mrs. Varkonyi and one of her cats are enjoying its music. The enclosure contains two 15-inch woofers, mounted amidships one above the other, both facing into the living room. They share a narrow horn that begins at their backs, flares abruptly and opens into the corner. A 10-inch middle-range speaker is mounted at the top of the enclosure, facing down. A five-inch treble speaker is below it, facing up. A plaster cone hangs between them to diffuse sounds. Irked by space limitations, Varkonyi is still not entirely satisfied with his latest creation—a hi-fi fan's normal reaction.

STRANGER THAN IT LOOKS, the massive enclosure at right, in the home of Duncan S. Robinson, New York estate planner, has a unique internal arrangement. Its centered 15-inch coaxial speaker faces towards the ceiling. Directly above the speaker is a plaster cone, which causes the up-traveling sound waves to turn and travel horizontally. Behind the cone, facing towards the room, is a convex plaster reflector. This catches the horizontally traveling sound waves and diffuses them widely throughout the room. The speaker horn starts from the rear of the speaker, first flares downward, then turns towards the wall. There it folds back on itself and its sounds come out the enclosure's front, through side and bottom panels.

Look baffling? It is infinitely so

AN "INFINITE BAFFLE," so-called because the backs of the loudspeakers are completely enclosed and no sound can escape from there to the front, is the type of enclosure that William H. Bean, a consulting engineer of Tuckahoe, N.Y., has constructed. It fills one corner of his living room from floor to ceiling.

Mr. Bean is seen above tightening up his multicellular mid-range speaker. He salvaged it and the lower of his two 15-inch woofers from a movie-theater system for $50. The little brass ring above his mid-range speaker is the mouth of an ultra-high-frequency tweeter (for the highest notes).

A thin hardboard false front, the same color as the walls of the room and decorated with an oil painting (right), normally covers the enclosure. An old radio-phonograph cabinet, its former insides removed to accommodate a hi-fi pickup, pre-amplifier, amplifier and turntable, stands in front of it.

The middle and bottom panels of the enclosure are reinforced with concrete and weigh 200 pounds apiece.

Please turn the page for more hi-fi pictures.

Billy Rose's estate is wired for sound

FIVE LOUDSPEAKERS are strategically placed in various parts of Billy Rose's impressive house and grounds in Mt. Kisco, N.Y. They enable the well-known theatrical producer to listen to his records or radio almost anywhere he happens to be on the estate.

The console of Mr. Rose's elaborate hi-fi system, designed and installed by the Fisher Radio Corp., is located in the game room. In it is a 15-inch speaker. On the console's control panel is a dial that turns on other speakers, in the dining room and master bedroom, in the attic and beside the swimming pool. They can be turned on singly or in pairs. Separate controls for the dining-room speaker are located under the dining table (left).

FROM AN ATTIC WINDOW, marked by an arrow in the photo above, sound from a 15-inch speaker pours down upon the terrace behind Mr. Rose's house and out across the broad, flat lawn between the house and the swimming pool. The speaker (right) is mounted at the back of a sloping wooden chute, the mouth of which fills the bottom half of the attic window.

IN THE SUMMER HOUSE at the far end of the pool (below left), within easy reach of anyone sitting at a picnic table there, are the volume and on-off controls for a mammoth horn tucked away on a vine-screened patio (arrow) at the other end of the pool. The horn (below right) was designed to obtain maximum efficiency from the speakers at the back end of it.

How to Frame a Living Picture

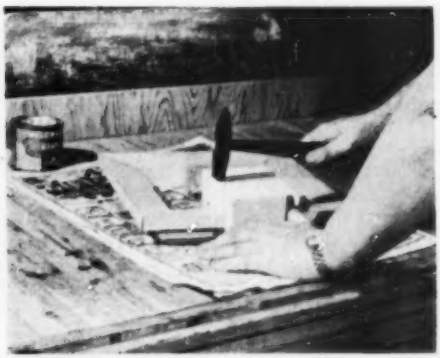
Green-thumb masterpieces look doubly attractive in this unusual wall planter.

IF YOUR wife has a way with plants, she'll go for this picture-frame planter. Decorative and practical, it will give her an old-master setting for that pet ivy or favorite blooming perennial. Best of all, you can whip out the project in a good deal less time than it takes to transplant an African violet.—*Jim Miller, Moline, Ill.*

FRAME SECTIONS. Planter frame is actually a frame behind a frame. Four front members are ¾" by 2" by 12", with 70° beveled faces. Smaller rear frame members are 1" by ¾".

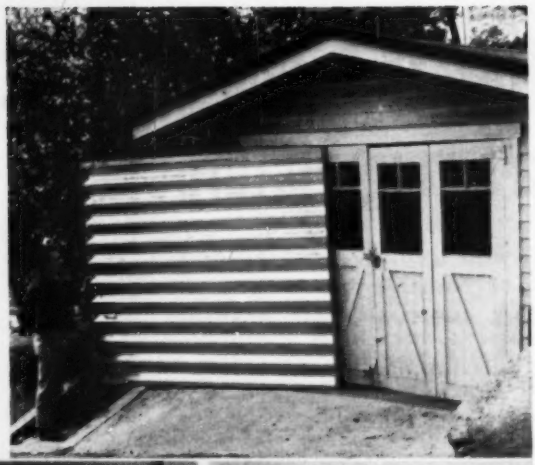
FRAME JOINTS. Assemble both frames with glue and brads. Then glue and nail the two frames together, taking care that inside edges of both are aligned. "Picture" opening is 8" square.

PLANTER BOX. Earth-holder is 3½" high, 3" square at bottom, and 3½" by 3½" at top. (Back of box has no taper.) Use ½" stock for sides and bottom, ¼" for front and back.



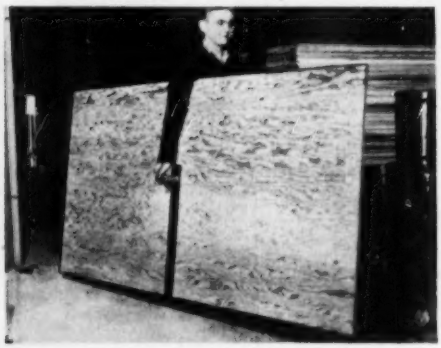
FINAL STEPS. Glue and nail partially assembled box in cutout in frame. Next, attach front and bottom. Finish the planter to harmonize with wall. Attach screw eye for hanging.

New for the Handy Man

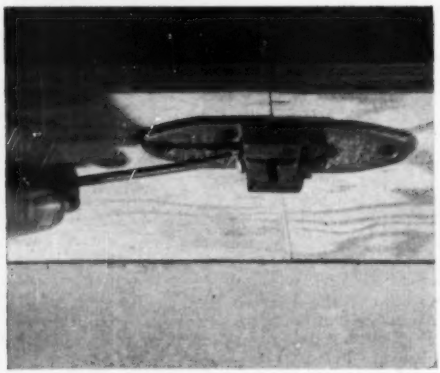


1. Carton Becomes Work Horse. On horses made from the carton it came in, you can assemble a new aluminum swing-up garage door (right) in two hours. The carton's top and bottom are folded into Vs (below) and tied with nylon tape provided. Door comes in 8′-by-7′ and 9′-by-7′ sizes, can be assembled with screwdriver and pliers.

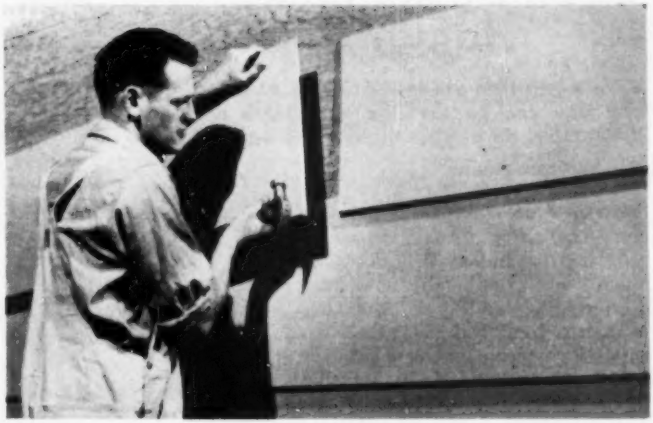
2. Handle Helps Tote Big Panels. One man can easily carry large panels of plywood or plasterboard with this steel carrier. The tool has a handle at the top and a hook at the bottom that will take panels up to 1″ thick, moving them safely. Extra-long panels require two carriers.



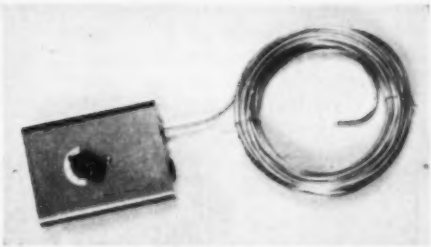
3. Hidden Fastener Levels Joints. The fastener below, screwed into adjoining table boards, contains two vertical setscrews and a horizontal bolt. Tightening up the bolt draws the boards together, and adjusting the screws levels them.



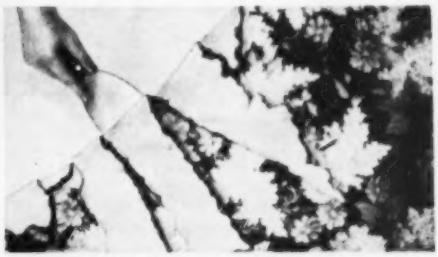
4. Siding Goes On Fast. No wedges or furring strips are needed under this plywood siding. It has a wide bevel along its full width, and needs only to be lapped and nailed. A special grainless, resin-fiber surface over exterior plywood makes it easy to paint. These weatherproofed panels are available in 12″ to 24″ widths and 8′ and 9′4″ lengths.



6. Cement Blocks Interlock. The only time you use mortar on the blocks above is after the wall is built. Otherwise, they are held together by an interlocking tongue-and-groove arrangement. Mortar is sprayed on later to make the walls firm and weatherproof. You needn't be an expert to build them up to eight feet or more in a day.



5. Thermostat Is 46 Feet Long. This heating regulator senses the temperature outdoors, indoors and in the heating ducts or pipes. Thus it anticipates temperature changes to keep house warmth constant. A liquid in the tubing expands or contracts according to the temperature and causes a bellows to turn the furnace switch on or off. Installation takes less than an hour.



7. Chemical Loosens Wallpaper. After this chemical soaks through old wallpaper, you can easily scrape the paper off. A pint added to water makes 2½ gallons.

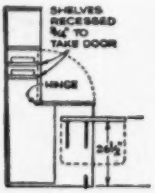
Further information on the products described on this and the preceding page can be obtained from: 1. Stevens-Thuet Co., 2165 Cowles St., Long Beach 13, Calif.; 2. Gypsum Ceiling Jack Co., Cedar Rapids, Iowa; 3. U.S. Plywood Corp., 55 West 44th St., NYC 36; 4. Walton Plywood Co., Inc., Box 1120, Everett, Wash.; 5. Automatic Devices Co., Inc., 714 Hillgrove Ave., Western Springs, Ill.; 6. Interlock Block Co., Inc., 2002 Wayne St., Erie, Pa.; 7. Wilson-Imperial Co., 115 Chestnut St., Newark 5, N.J.

Good Desks Make Homework Easier

Give a growing student his own place to study and you can be sure he will. Here are three desks that do almost everything but the work.

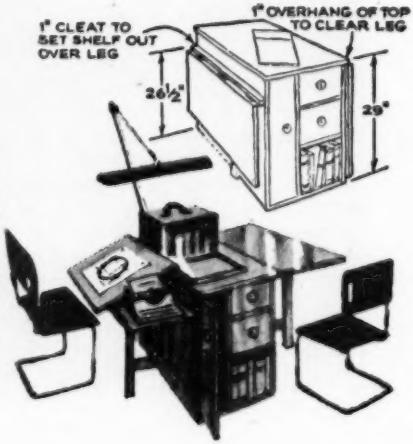
By Walter Buehr

Two old card tables make the dual-level study area below, which can be dismantled quickly. One table is used full height for writing or drawing, while the other has two legs removed and the two other legs shortened for typing or use by a smaller child. Low table is then supported by metal plates that hook over bolts through legs of the high table. Collapsible drawing board is tilted up by wood strip hinged to underside. Wall map is pasted over cork or soft wallboard so colored pins can be pushed in to mark imaginary journeys.

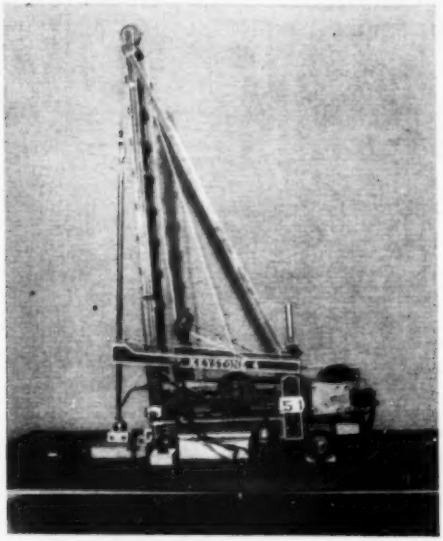


DRILL HOLES 1" apart (sketch above) to take latch bolt that holds top edge of drawing board at each side.

A complete study center, the cabinet above has a tall shelf for books, short ones for cigar boxes to hold paints and pencils. Hinged desk swings down to rest on opened doors, held rigid by doorstops. Small shelf, hinged to one door by folding metal brackets, holds typewriter. Drawing board can be slanted to any angle by sliding door bolts into holes in cabinet. Lamp slides on pivoted pipe arm, can be raised or lowered by looping wire through cord adjuster.



Two drop leaves hinged to the cabinet at right give two kids plenty of room to work together, yet the leaves fold up into a small space. One leaf, for writing, is 29" high; the other, for drawing board and typewriter, is 26½" high. The cabinet, made of ¾" plywood glued and screwed together, has a single leg hinged to each side to support a leaf. The tall compartment stores the drawing board and other bulky objects, while the shelf and drawers provide plenty of room for books and supplies

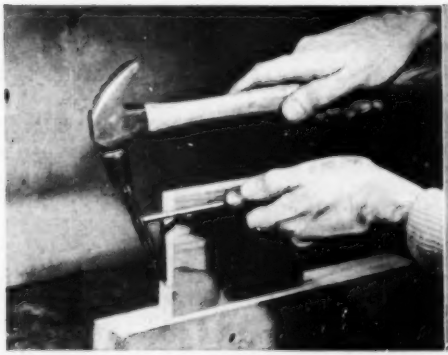


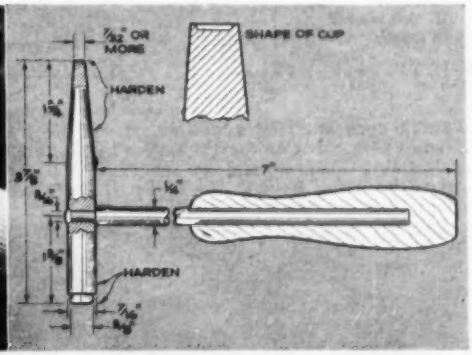
Model Rig Drills Half-Inch Hole

When a big Keystone rig began drilling test holes near Louis W. True's home in Joplin, Mo., True went to work on a 33" reproduction of it. Powered by an electric motor, the model is complete from its folding frame to a friction hoist. Its stroke is 1½", number of blows per minute: 55. The rig digs a ½" hole, and can pull its 26" string of tools out of the ground mechanically.

Hose Softens Swing's Bumps

Children seem bound to get their heads bumped by careening back-yard swings. The blows will be less damaging if you screw scrap garden hose or car-heater hose to each edge of the swing, as shown above. *—R. C. Schneelock, Tulsa, Okla.*

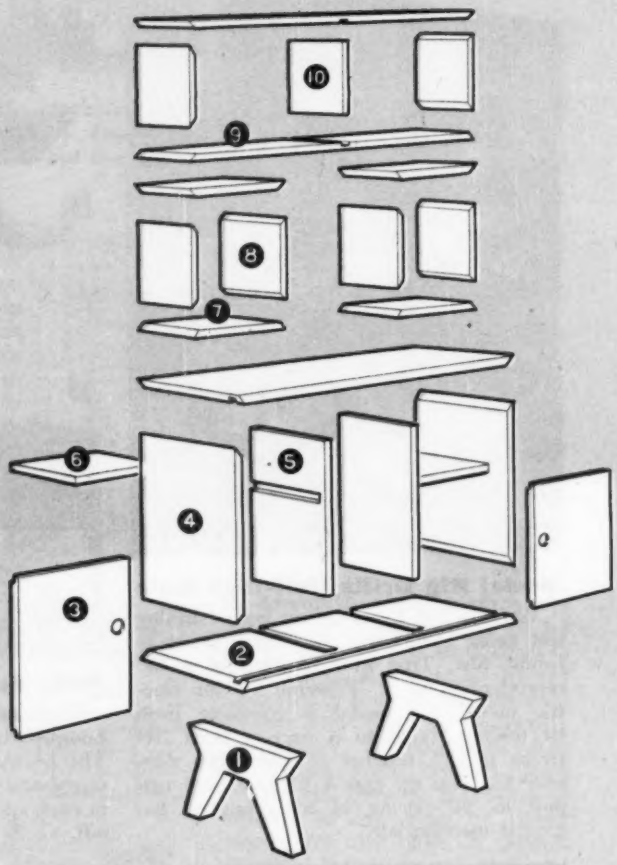




Nail Set with a Handle Helps When the Hammering Is Awkward

The nail set shown in use above, fitted with a handle to make it easier and safer to hold, helps drive nails home in places where a hammer alone would bend them or mar the work. It transmits the force of the hammer blows in a straight line to the nail. It can also be used as a light hammer for tacks and brads.

You can make the nail set from 7/16" drill rod, shaping it as shown above, or buy a nail set and add a handle.—*Walter E. Burton, Akron, Ohio.*

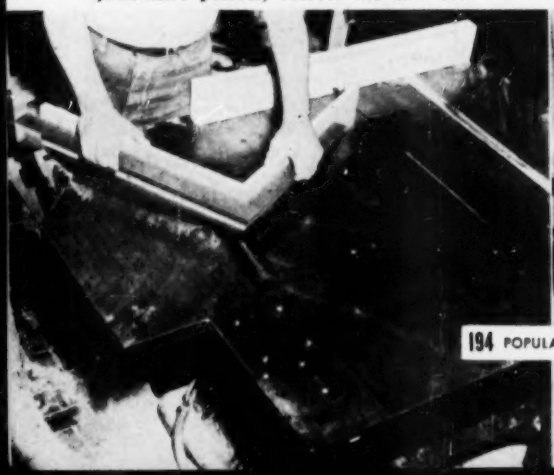


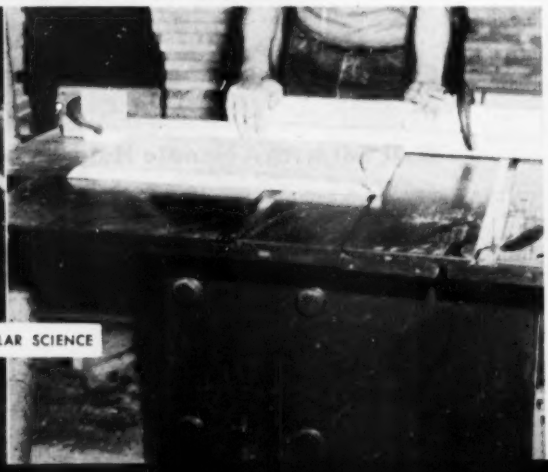
PARTS LIST

Part	Number Needed	Dimensions
1. Leg	2	1¼"x10"x15"
2. Chest top and bottom	2	¾"x15½"x58½"
3. Chest door	2	¾"x22⅝"x19"
4. Chest end	2	¾"x15½"x23½"
5. Chest partition	2	¾"x14¼"x22½"
6. Chest shelf	2	¾"x14¼"x18¼"
7. Small bookshelf top and bottom	4	¾"x9"x14"
8. Bookshelf end	6	¾"x9"x12"
9. Long bookshelf top and bottom	2	¾"x9"x58½"
10. Long bookshelf partition	1	¾"x9"x10¾"

MITER CUTS MUST BE ACCURATE. If you use a bench saw, check on the 45° setting by placing a framing square around two scrap boards that have been run through the blade. If the test joint isn't perfect, correct the saw tilt.

READY FOR QUANTITY PRODUCTION. After you have mitered one end of each board, clamp a stop block to the pusher bar at the correct distance from the saw for the parts you are cutting. They'll come out identical.

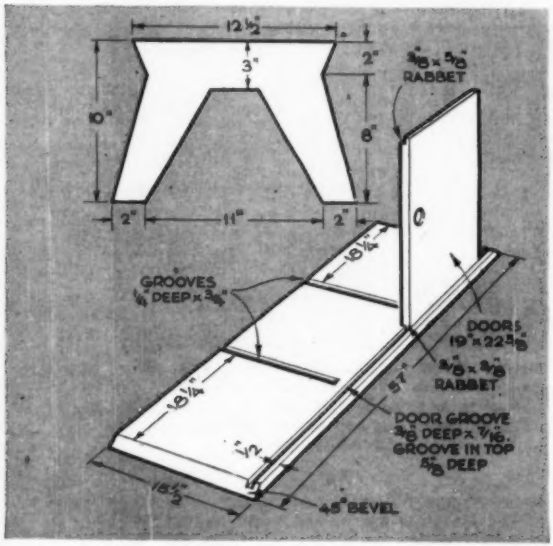




For displaying books, chinaware or silver, or just as a catchall, you can't beat this

Modern Oak Lowboy

A natural bench-saw project, cabinet offers shelf space to show off family treasures; hides less sightly items behind a pair of sliding doors.



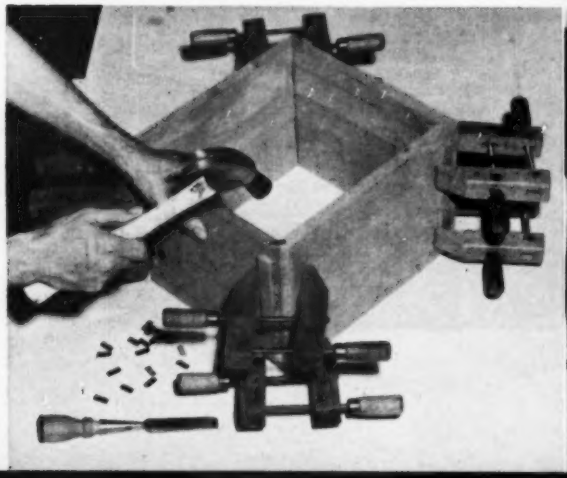
By H. H. Connelly

HERE'S a modern oak lowboy that's easy on the eyes and just as easy to build. In the living room or den it makes a fine place to display and store books, magazines and knickknacks. As a dining-room sideboard it can be used to hold linens and to show off decorative china and silverware. And in a rumpus room it becomes the handiest of catchalls. Its sliding doors, with their recessed finger holds (shallow 2" drillings), are ideal for spots where hinged doors would be awkward.

Rectangular construction, simple mitered joints and groove-type slides make the lowboy a natural bench-saw project. But if your handsaws are sharp and you have a good eye, you can tackle the job with equal confidence.

The list of dimensions shows that except for the 1¾" leg stock, all parts are

ASSEMBLING PARTS IS NO PROBLEM. Glue small oak strips across the ends, one inch back from mitered joints. After they have set, apply glue to joints and pull wood tight with clamps. Metal fasteners finish the job.

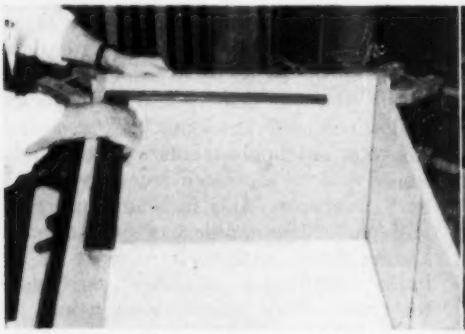


WHAT TO DO WITH CLAMPING STRIPS when the joints have set? Knock 'em off with a chisel and carefully sand away the surplus glue. If you're a bearcat for structural strength, you can add triangular fillets to the corners.

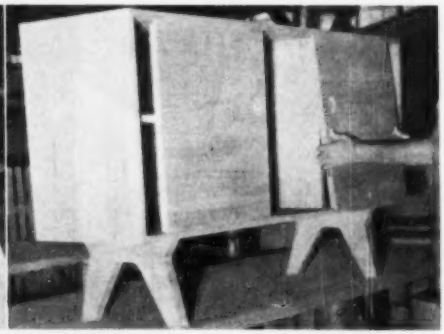
cut from ¾" white oak ripped to one of four widths: 22⅝", 15½", 14¼" and 9". After parallel ripping, the individual members are each cut to the length given, plus 1". The extra inch allows for accurate 90° and 45° final trimming.

The legs, cut from solid oak stock or built up from two 1" sections glued together, are a coping- or scroll-saw operation. Grooves for partitions and door slides can be cleared with a maul and chisel, or run out with a dado attachment. All joints are secured with resin-type glue, which is impervious to moisture. Sand all parts carefully, rounding exposed corners slightly.

Finishing is a matter of choice. In general, modern furniture calls for a natural or grain-lightening treatment. A coat of white lead primer, brushed into the open pores and then wiped from all surface areas, is a good starter. Follow it with two coats of white shellac, each hand-rubbed after it is dry, and you will have one of the most popular of present-day finishes.

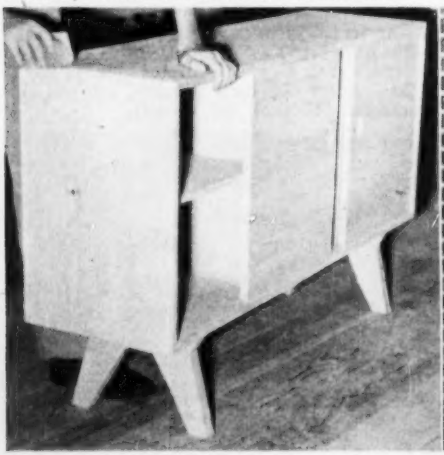


LONG CHEST AND BOOKSHELF need special attention. To insure square joints, retain the frames in an outer framing of strips nailed to the bench or floor. Make a final check with a square. Partition is added after miter joints set.

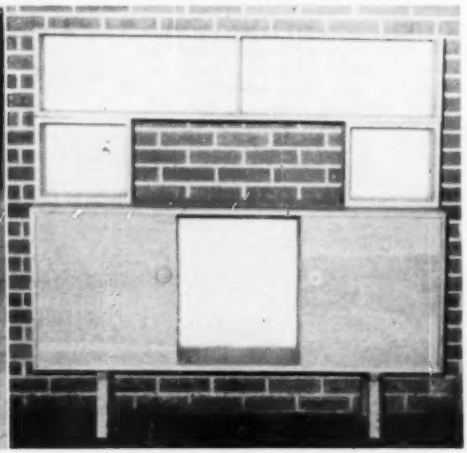


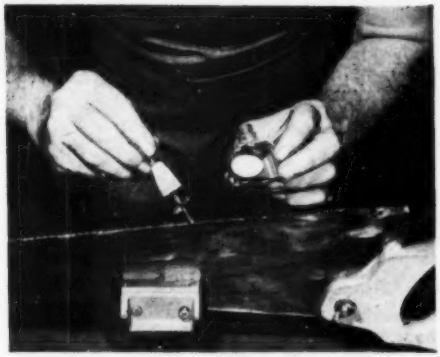
SIMPLE TRICK HOLDS DOOR IN PLACE. Slide groove in top of chest is ¼" deeper than bottom groove; so is top tenon, or projection on edge of door. Lift top tenon into groove and bottom tenon will fall in place.

WITH LEGS TO STAND ON (they're attached with countersunk wood screws from above), the chest is ready for sanding. But before you start, you should round all sharp corners slightly and carefully remove all dents and scratches.



FINAL TOUCH, before wood-finishing, is backing of ⅛" Masonite for the chest and shelves. The smooth (inside) surfaces of the Masonite can be painted a contrasty color for dramatic effect, or made to simulate natural oak.



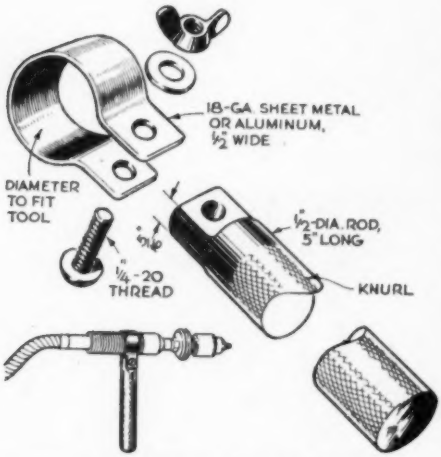


Color Shows Where to File Saw

It's easy to miss some teeth or to file others twice when sharpening a saw, especially if you are interrupted during the job. This won't happen if you daub the teeth with thin nail polish or red model-airplane dope before you start. Filed teeth show in good contrast to the red ones you haven't touched. The harmless color usually flakes off when the saw is used.—*Gilbert C. Close, Hawthorne, Calif.*

Mark Balance Point on Ladder

To cut the time and effort needed in carrying a long ladder, paint a color band on one or both sides at the point where it balances. You won't have to shift your grip several times to find the best carrying position.—*Earl E. Kasdorf, Dover, Pa.*



Handle Improves Grip on Shaft

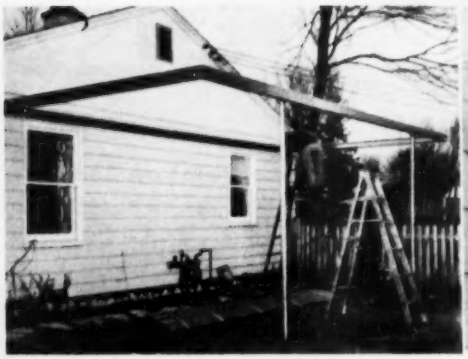
Grip a flexible-shaft tool with both hands for better control when swinging a large sanding disk or doing heavy drilling.

An auxiliary handle can be quickly made from a length of ½" steel rod and knurled for good gripping. Clamp it on the shaft head with a ¼" bolt and wing nut.—*Philip E. McCafferty, Naches, Wash.*

Stand Holds Saw Accessories

Power-saw accessories will always be within easy reach if you store them on a stand like this one. The wood strip shown on the bottom shelf fits in the notches that support the rip fence, making the stand a convenient outboard support for cutting panels or long boards. Finish the stand with enamel to match the saw.—*Howard R. Clark, Springdale, Ark.*

New for Your Car



1. Carport Goes Up in a Day. Adding a 20-foot carport is a quick screwdriver job with this kit of aluminum parts that bolt together. With the car removed, it also doubles as a cool shade for a terrace. An outer frame is first screwed to the house on one side and supported on pipe columns sunk in the ground on the other (above left). Corrugated strips are then bolted to the frame through predrilled holes (right). The corrugations channel water off quickly and let some air through to let heat escape and reduce wind-loading. The kit weighs less than 300 pounds.

3. Spare Tire Rolls Sideways. A new mounting for this outside spare wheel swings it almost completely to one side for easy access to trunk and filler cap. Available for Fords from '52 on, it is automatically held off-center by a spring.

2. Battery Cable Works Itself Loose. As you loosen this battery cable, the shouldered bolt forces the connector apart like a screw jack. It can then be easily removed without prying and pounding that might injure the battery.

4. Touch-Up Paint Sprays On. Body scratches are quickly and smoothly patched with this touch-up paint that comes in a spray can. It is available in all current Ford and Chevvy colors plus white, aluminum and gray primers.

Further information on the products shown on this page can be obtained from: 1. Kawneer Co., 714 N. Front St., Niles, Mich.; 2. Stamco Mfg. Corp., Pico, Calif.; 3. Ford Motor Co., P.O. Box 638, Dearborn, Mich.; 4. Tempo Products Co., 2075 E. 65th St., Cleveland 3, Ohio.

Here's your guide to buying or mixing

Baby-Safe Paint

Lead-based finishes are a real hazard to nursery nibblers. But these tips will avert a tragedy.

By Kenneth Murray and Darrell Huff

ARE you planning to paint, or repaint, anything a baby might chew on? If you are, proceed with caution. Many paint pigments, though harmless when handled and treated normally, can poison a baby who nibbles on them. And babies often nibble.

The danger applies not only to toys and the baby's own furniture but to other things as well. A baby is likely to chew on a desk or kitchen chair, for instance, as happily as on his own crib or play pen. He will also pick up bits of paint from peeling walls or chew on window sills

YOU CAN BUY SAFE PAINT for baby furniture and toys, but it is not always easy to find. Best rule is to use only paint specifically described by the maker as safe for nursery.

and other casings of convenient height.

This danger is so real, and has produced so many cases of lead poisoning in small children, that a Baltimore ordinance on housing hygiene contains this provision:

"No paint shall be used for interior painting of any dwelling or dwelling unit or any part thereof unless the paint is free from any lead pigment."

Plumbism—lead poisoning—takes a number of forms and often produces symptoms not easily recognized. Fatalities are not uncommon. The New York board of health reported 15 cases of lead poisoning in six months; 11 were among children, and there were four deaths. The seriousness of even nonfatal cases is evident from this medical report on one form of lead poisoning:

"The prognosis in lead encephalitis in children is poor; the high mortality rate, as well as the incidence of severe, lifelong, residual nervous system injury, has been commented on by many investigators. The mental development of even the less severe cases may be seriously impaired."

The insidious nature of lead poisoning should also be kept in mind. Lead poisoning may be cumulative. Regular intake of tiny amounts of lead, not dangerous in one dose, can eventually produce the severe symptoms.

Most Toys Are Harmless

All this sounds very frightening. Parents, however, need not be disturbed since lead poisoning is easily prevented.

Painted furniture and toys produced by reputable manufacturers offer no dangers. Finishes used on them are carefully chosen for their harmless quality and usually are specially manufactured for the purpose.

The danger lies in two places: repainting children's things with lead pigments; interior surfaces that are painted with lead paints.

The answers are simple. Use only lead-free paints when refinishing toys or baby furniture. If there are any other surfaces in the house on which a baby chews, remove old paint and refinish with safe paints.

Finding a safe paint is not always easy. The simplest solution is to buy a paint described by the manufacturer as non-toxic and safe for nursery use. There are a number of these, including at least one

YOU CAN MAKE SAFE PAINT by adding certified food colors to either shellac or lacquer. This produces a fast-drying enamel. The best covering power is obtained by mixing titanium dioxide (up to 20 percent) with white shellac. Vegetable colors give a variety of tints.

made specially for this purpose.* Also widely distributed and specifically recommended as safe for babies is a general-purpose enamel, Sapolin Speed Enamel,* that comes in a satin finish. It is made in a wide selection of attractively styled colors and this applies also to baby-safe products of other manufacturers; so there is little excuse for using a potentially dangerous paint.

It should, however, be kept in mind that even these products are safe only after they have been applied. No paint, before it has been used, should be left where a small child may taste it.

In the absence of a guaranteed-safe paint, the danger can be reduced by taking some simple precautions. The first of these is—don't use any paint unless the label lists the ingredients. If any lead is included, don't use that paint for this purpose. But watch out with equal care for a mention of chrome yellow, green, or orange, names that camouflage the presence of lead in the form of lead chromate.

These are not absolute precautions. Other ingredients, drier or vehicle as well as pigment, may be at least somewhat harmful.

Home-Mixed Paint Is the Best Bet

The only really safe procedure if you do not use a paint that is sold under a guarantee on nontoxicity is to make your own. This can be done fairly easily and most satisfactorily by adding harmless U.S. certified food colors to either shellac or clear lacquer.

Of the two vehicles, shellac is the easier to use. It is the "lacquer" of ancient artisans. Shellac enamel, easily mixed at home, looks like regular enamel but has all of the convenience of shellac. It has elasticity, quick drying time (a fraction of that required for ordinary enamels) and good sealing properties. Tinted shellac enamel is often used by manufacturers of Venetian blinds, and black shellac enamel has been found to give an un-

*A product made especially for nursery use is Zynolite Baby Enamel, which comes in pink, blue, white, green, yellow and transparent shades. The maker is Zynolite Sales Co., 1646 S. Vermont Ave., Los Angeles. Speed Enamel is made by Sapolin Paints, Inc., 729 E. 42nd St., NYC.

Mixing Baby-Safe Paint

In the chart below, the size of the dots indicates the *approximate* proportions of color required to produce the shade you want. Use vegetable colors for red, yellow and blue; fine lampblack or bone black for black; titanium dioxide (best) or fine whiting (cheapest) for white. Mix with white shellac.

	RED	YELLOW	BLUE	BLACK	WHITE
REDS					
Crimson	●			•	
Wine	●		•	•	
Scarlet	●	•			
Rose	●		•		•
Vermilion	●	●			
GREENS					
Bottle Green		•	•		•
Olive		•	•	•	
Spring Green		•	•		•
Jade		•	•	•	•
BROWNS					
Leather	•	●	•	•	
Cinnamon	●	•	●	•	
Chocolate	•	•	•	•	
YELLOWS					
Lemon		●	•		
Buff	•	●		•	•
Peach	•	●			•
Mustard		●	•	•	
BLUES					
Chinese Blue	•		●	•	•
Dutch Blue			●	•	•
Aquamarine		•	●		•
Navy	•		●	•	
GRAYS					
Steel		•		•	●
Gunmetal				●	•

usual mirror finish to floors. Brushes are easily cleaned; even when hardened they can be reclaimed by soaking in alcohol.

Mixing pigment into ordinary white shellac is quite simple. Probably the cheapest white pigment is whiting (fine chalk), which is often used in regular paints. Much better covering power is obtained when you use titanium dioxide, which may be added in any quantity up to 20 percent. For black, use fine lampblack or bone black. For the various colors, use vegetable coloring.

Vegetable colors are sold by drugstores but are even more commonly available in the form of 10-cent bottles of liquid food colors. These usually also contain propylene glycol and water. The latter is not mixable with shellac; therefore the color should be poured into a small pan and the water evaporated by mild heat. Add denatured alcohol to bring it to the original bulk and return it to the bottle, relabeling it "Paint Coloring."

Always use the best grade of denatured alcohol for thinning shellac or shellac enamel; never use auto antifreeze.

To make a wide variety of tints, colors and shades, follow the accompanying color mixing chart. Stir in one pigment well before adding another. Use an empty coffee tin, or other clean can that has a well-fitting lid.

In applying the shellac enamel, you'll be surprised at the easy brushing qualities. Use a full brush and apply rapidly.

Two other nonpoisonous finishing methods are available, both using liquid food color as it comes from the bottle. The first is a color stain to be applied to unfinished wood. Mix the colors or use them as they come, testing them on a scrap of wood. If necessary, dilute with denatured alcohol. Apply with a cloth or brush; when thoroughly dry, add a coat of either clear white shellac or paste furniture wax. For the second method, mix the colors directly with liquid self-polishing wax. Apply with a brush. After one hour, cover with one or two coats of paste furniture wax. END

HINT TO AN UNHANDY HANDY MAN

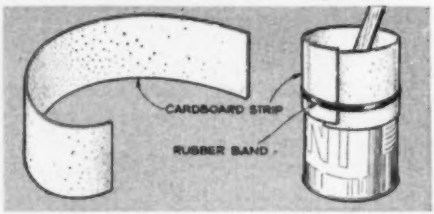
The greatest of neatness and skill don't matter,
For, when you're painting, some paint will spatter.
So, cover yourself and surrounding spaces,
And you won't have to scrape off the spattered places.

—Berton Braley

Twin Easel Serves Two Artists

If there are two would-be artists in the family, this twin easel will keep them both busy. The work surfaces are 21"-by-24" sheets of ½" plywood screwed to two-by-two legs. Lengths of furnace chain keep the halves from spreading too far.—*Joseph C. Hayden, Lexington, Ky.*

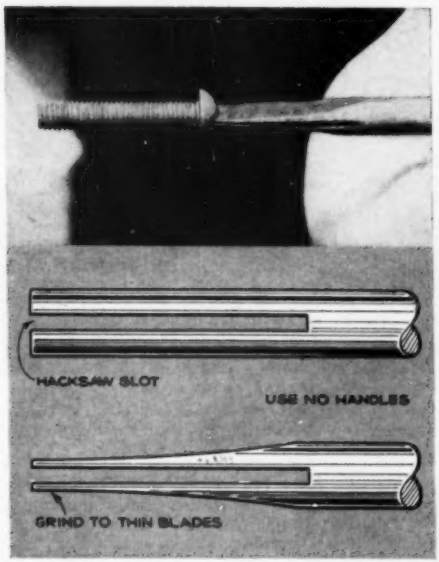
Guard Prevents Paint Splash



You can stir a full can of paint without spilling, and avoid transferring it to a bigger can, with a simple splash guard. Wrap a wide cardboard strip around the can, and hold it with tape or a rubber band.—*Norm Jacky, Fond du Lac, Wis.*

Gate Weight Is Like Pumpkin

An orange pumpkin dangling from your gate adds color to your lawn. This one, a painted iron ball, is used to keep a swinging gate closed. Hook it on a chain tied from the gate to fence or to a stake in the ground.—*Walter E. Burton, Akron, Ohio.*



Spring Blade Starts Screws

This spring-blade screwdriver is handy to start screws in tight spots. The two blades hold the screw and are easily compressed to release it. Saw a slot in a short piece of drill rod or the shank of an old screwdriver. Then, grind the blades to a long taper. Don't use a handle.—*Ivan Grosvenor, Indian Rocks, Fla.*

Toy Propellers Mix Paint

Space a matched pair of toy boat propellers on a length of ¼" rod to churn up a can of settled paint in fast time. Use a prop having right-hand pitch to throw the paint downward and mount a left-hand prop at the bottom end of the rod to spin it up.

Experiment with the spacing between the propellers until they mix the paint without splashing it out of the can.—*Carl B. Hogan, Pikeville, Ky.*

Molding Fences In Tools

Half-round molding nailed around a stepladder shelf and top step will keep your tools from rolling off.—*A. Vena, Phila.*

Whatever or wherever the job you have to do, there's a good chance that you will be able to handle it with this

New Work Horse on Wheels

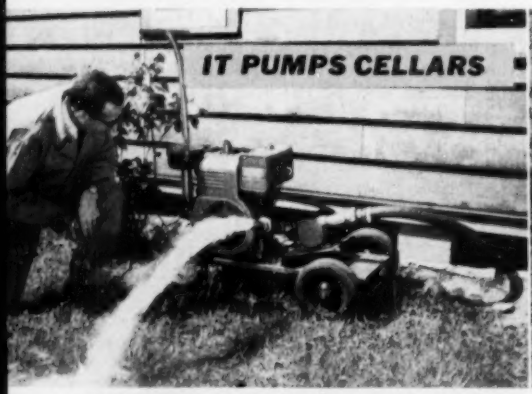
ONE of the handiest gadgets around is a dolly-mounted gas motor and accessory combination called the Powerslave. It can do almost anything.

Want to sand a boat hull? Lift a generator onto the dolly, run a belt to the one-lunger engine, plug in your sander, and let this outfit do the muscle work. It will also pump out a basement, saw a plank, spray trees, or paint an airplane.

Born in the shops of Master Mechanic Mfg. Co., Burlington, Wis., this rig-of-all-work is the brainchild of the company's president, Harry J. Allen. He wanted a power source that could go anywhere around a farm, home, construction job, or industrial plant and operate as a generator, pump, air compressor, and sprayer.

The power package he fathered now comes in two models. The smaller one, with a 2½-horsepower engine, can run a 1,200-watt generator, a 60-gallon-a-minute centrifugal pump, and a 4-cubic-foot-a-minute air compressor.

Big boy of the family is the Model 600. It has a 6-horsepower one-lunger, to



DRYING OUT a seagoing basement is no chore with the pump. Wheel the rig outside a cellar window, drop the intake hose, and start up. The smaller unit can pump 60 gal. per minute.

CUTTING UP DEADFALLS or storm-dropped limbs calls for the generator and an electric chain saw. As the rig can be trundled about, you can cut wood into logs right where it fell.

BLAZES CAN BE DOUSED if there is water handy. The switch from some other accessory to the pump takes about half a minute. With the big unit you can pour on 7,200 gal. per hour.

PORTABLE POWER TOOLS can be used anywhere by plugging them into the portable generator. An electric saw like this can cut not only lumber, but stone, masonry blocks or tile.

IT SPRAYS PAINT

AS A PAINT SPRAYER, the unit compresses air in a detachable tank and supplies pressure to a conventional spray gun. The tank, mounted at one end of the wheeled dolly, has a caster to carry its weight. Large model shown delivers 8 cu. ft. of air per minute. Insecticides are sprayed from a pressure tank.

ACCESSORIES DROP INTO PLACE. The detachable mounts, which strike a familiar note to users of multipurpose shop motors, consist of a rod bolted to each accessory, and two notched bearing plates welded to the dolly.

The rod is dropped into the notches and the machine tilted up to slip the belt on. Belt tension is provided by the weight of the driven unit at the proper angle.

At right, the generator is being placed on the dolly. In right foreground is the two-cylinder compressor.

The secret of both models' efficiency is accurate pre-positioning of all accessories on the dolly.

which you can attach a 2,500-watt generator, a 120-gallon-a-minute centrifugal pump, and a compressor rated at 8 cubic feet of air a minute.

Each of these accessories is bolted to a baseplate with a rod running along one edge. The rod drops into two slotted bearings, welded on the dolly bed behind the engine. A pin is slipped through a cross hole and shifting becomes impossible. Changing to another attachment is a matter of pulling the pin and lifting one unit out and the other in.

Spray the Garden or Fight a Fire

If, for example, you've been spraying the garden (two acres an hour), and suddenly notice a grass fire, you can switch from compressor to pump in jig time. Yank the pin, flip the belt off, and lift off the compressor. Swing up the pump, slip the belt on, insert the pin and drop the suction hose into the water. You're ready to drown a blaze. Time: 30 seconds.

Any job calling for power tools such as chain saws, portable saws, and electric drills can be done with the Powerslave on a few tablespoonfuls of gas. Plumbing jobs are speeded by plugging a power pipe threader into the generator.

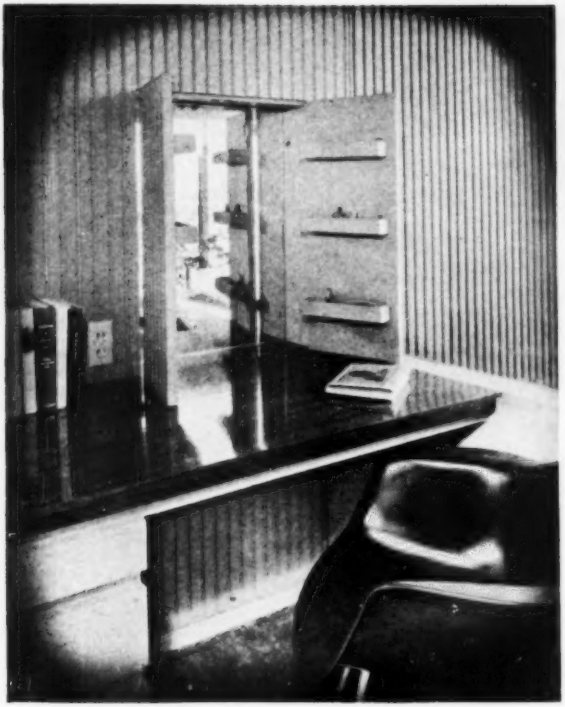
On a farm, the Powerslave can do a lengthy list of chores. Mount the compressor and you'll usually find a car, truck or farm machine with flabby tires. In a few seconds you can firm them up. It's also easy to knock the squeaks out of a chassis with some fast pressure greasing.

Whitewashing, regular painting, and spraying insecticides are all routine jobs. Spray liquids never pass through a pump mechanism where insoluble sediment may wear away impeller blades. Instead they are poured into a pressure tank and forced into the spray boom by air pressure, which also agitates the solution.

Substitute a pump for the compressor to irrigate the garden. Hoist the AC generator onto the rig and you can saw firewood or clip the hedge.

If the power line fails, you can still run your oil burner, refrigerator or freezer, and a couple of light bulbs with the smaller model. On the big No. 600, you can operate all these plus two or three electric-range coils.—*Kenneth Wylie.*

WHEELS KEEP IT PORTABLE, and even facilitate loading the power dolly onto a truck or station wagon by means of a ramp. Above are shown the tank and power accessories, together with some of the various tools and attachments that can be operated from the rig.



Half doors turn this kneehole desk into a

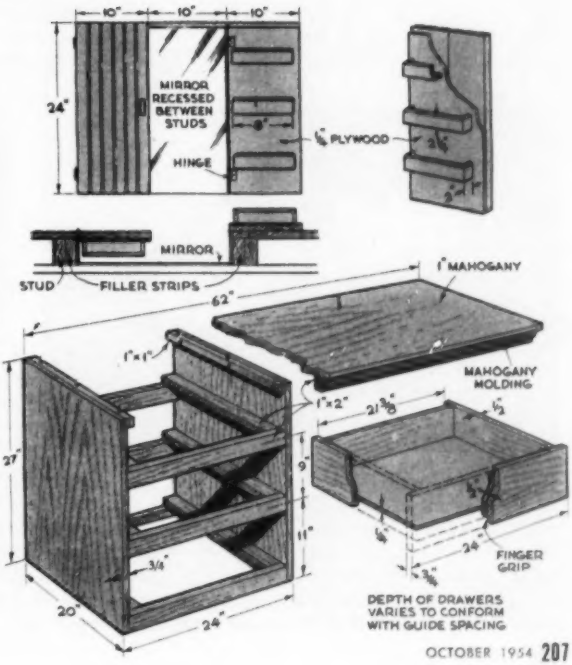
Hideaway Vanity

Set flush with wall, they open to uncover recessed mirror and racks for cosmetics.

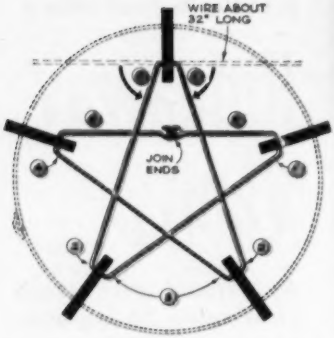
SO YOU don't like the disorderly display of war paint, doubled in a powder-fogged mirror, that interior decorators call "milady's vanity." Then look between two wall studs for a diplomatic solution to the problem.

When the wall-matching doors above this mahogany-topped table-and-drawer combination are closed, it serves as a handsome kneehole desk. Hinge back the doors and—presto—they disclose a 20″ mirror framed between cosmetics racks.

The dimensions given are for the hideaway vanity shown in the photo. But the arrangement can easily be adapted to a design which suits your own home. The desk drawers have an overlapping front with a beveled lip for a fingerhold.—*Hi Sibley, Nuevo, Calif.*

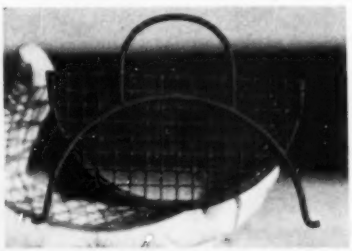


One Evening Shop Projects



Something different in hot-plate trivets results from combining five dominoes with coat-hanger wire. Remove the enamel from the wire with emery cloth. Drill a hole in the center of each domino half, of a size that will be a tight push fit for the wire.

Center the first domino on a 32" length of wire, bend both legs, and continue in the sequence shown. Use a full-size layout or measure each leg to make sure all are the same length. Crimp eyes on the ends tightly together. Then insert the outer wire circle and join its ends the same way.—*Frank Shore, NYC.*

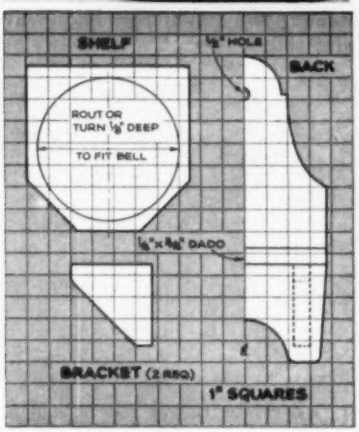


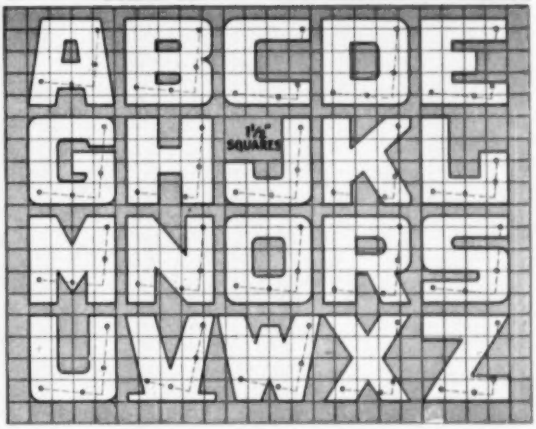
SHAPE END RINGS to 4" diameter, leg rings to same size with a foot at each end. Handles should be 1¾" high. File all sharp points off the cut edges of the wire mesh.

Airy metal in charcoal black is right for many modern rooms. This nut basket is a simple bending and soldering job.

Sandpaper the enamel off heavy coat-hanger wire and bend the ends and leg rings of the basket to shape, turning up feet as shown. Shape the handles around a 1½" bar or shaft, leaving the ends straight, and solder them to the leg rings.

Cut a 6½"-by-8" piece of ¼" mesh hardware cloth, shape it around a post or bottle, and solder it to the ends. Finally, solder half of a 4" disk of the same material inside each end.—*Clifton Morris, Lubbock, Tex.*





An old hand bell, such as you can pick up in many a secondhand or antique shop, makes an attractive ornament with Early American furnishings. It may even be useful to call children from play or tell Dad to quit mowing the lawn and come to supper.

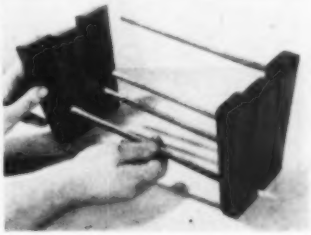
This shelf follows the bell contour. Drawn on 1" squares and made of ¾" stock, it is big enough for a 6½" bell. For a smaller one, draw the parts on ¾" or ⅞" squares.

If you turn the bell depression, do so before cutting off the shelf corners, or the work will swing out of balance. Fasten the shelf and brackets with wood screws through the back. Drive a finishing nail through the shelf into each bracket. *—John M. Avery, Dexter, N.Y.*

Block initials, joined by lengths of dowel, make an attractive personal book rack. All the letters except F, I, P, T and Y lend themselves to the project, and even these could be used by adding a base to each.

Cut the letters out of hardwood at least ¾" thick. Spot the dowel holes as shown for each letter. Drill them ½" deep from the insides of the letters, sand well, apply wood filler if necessary and finish with shellac and wax. Cut dowels 9" long and glue them in.*—Elma Waltner, Hurley, S. Dak.*

SYMMETRICAL LETTERS read right both ways. To make those like B, C, R, and S read correctly at the left end, relocate dowel holes to line up with those in the other letter. Some are decorative even in reverse. Be sure to drill blind holes from the proper side.

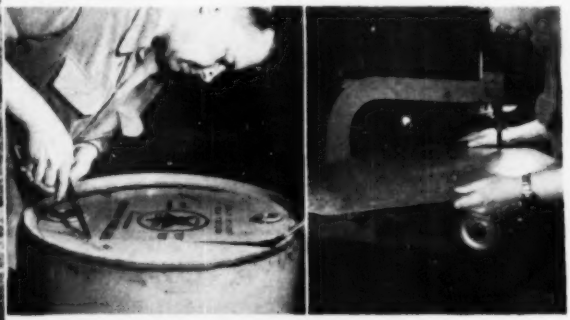


An Oil-Drum Trash Burner Serves

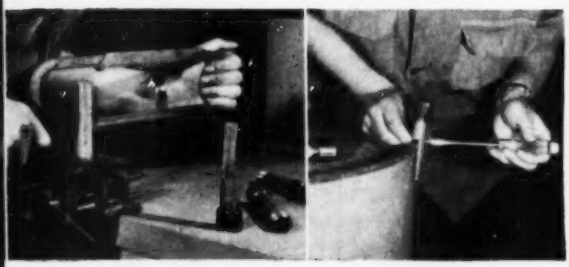
Use it the year 'round to dispose of burnable trash, and dump the

IT'S small sport to stand over an open bonfire of trash on a sweltering day, watching for flying sparks.

You can make a safe, king-size burning can that solves the rubbish-disposal problem from an empty 55-gallon oil drum. Parked in a corner of your yard, it incinerates any garden refuse that won't compost. In winter, when there's no activity in the yard, the can is a convenient receptacle for burnable trash in your basement shop. When it's filled with scraps and shavings, cart it outdoors on



SAW OUT TWO-THIRDS OF THE TOP of your drum with a keyhole saw, leaving a 1" flange and one-third of the top intact to support a hinged lid. Cut the lid from a piece of heavy-gauge sheet metal, making its diameter large enough to cover the flange around the opening. A piece of hacksaw blade with the ends ground to fit in a jigsaw makes cutting the drum cover an easy job.



MAKE THE LEGS FROM 6" PIPE NIPPLES. Cut away one side of each leg to fit against the side of the drum. Bolt them in place, using a large bolt through the rim, two smaller bolts through the side. Screw on pipe caps for feet.

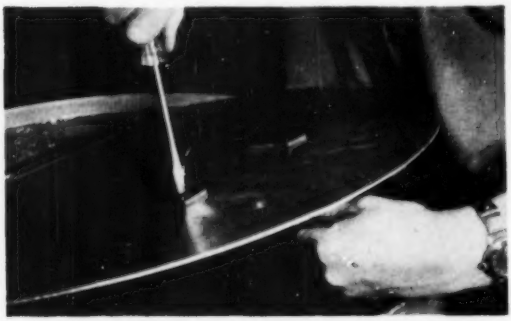
Shop and Yard

ashes over the flower beds.

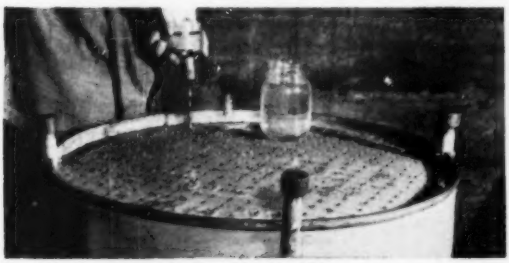
your lawn mower and toss a lighted match in it.

You'll have to peel off several bills to get a 55-gallon drum; oil companies charge service stations a deposit on them, usually around four bucks. They are worth it, though, being made of 18-gauge black iron that will last for years.

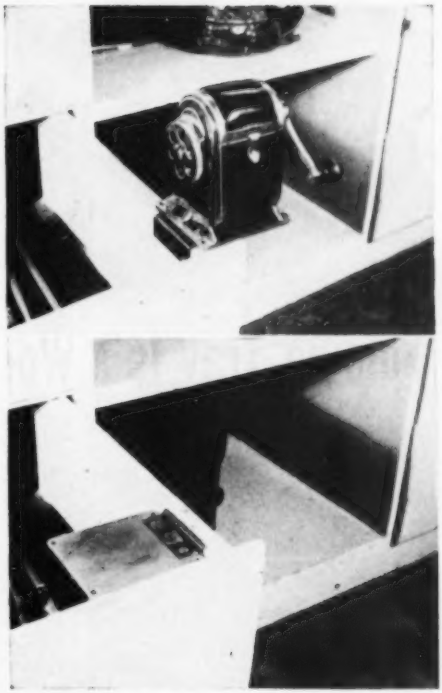
A coat of aluminum paint will make your burner look less like a rusty old drum, but painted or not, it will burn rubbish to beat the band.—*John Burroughs, Tacoma, Wash.*



ATTACH THE LID AND ADD A HANDLE. Bolt a length of steel piano hinge to the lid and remaining one-third of top. Put a steel spacer strip under back leg of hinge so the lid will lie flat. Cut two squares of asbestos shingle to insulate the handle from the lid. Drill asbestos squares and lid for stove bolts used to attach the handle to the lid.

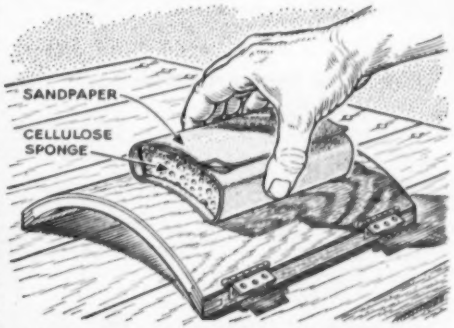


PERFORATE TOP AND BOTTOM of burner with ¼" holes. Rule checkerboards of 1" squares and drill a hole wherever two lines intersect. Keep the drill good and sharp, and cool it frequently by dipping it in water.



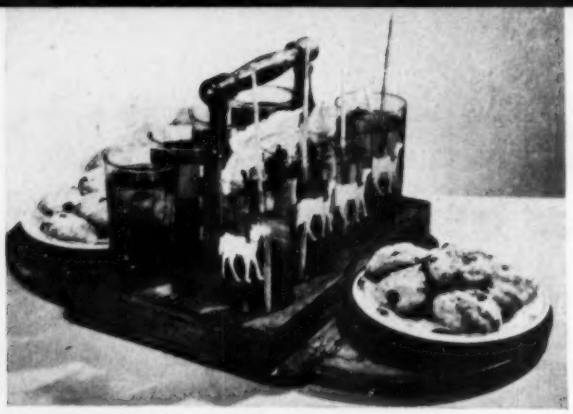
Drawer Hides Pencil Sharpener

One way to conceal a pencil sharpener and have it handy too is to attach it to a drawer. A sturdy hinge, fastened to the drawer with wood screws and to the sharpener with bolts and nuts, allows it to be swung up for use or flipped over into the drawer when not needed.—*Keith Heryford, Cedarville, Calif.*

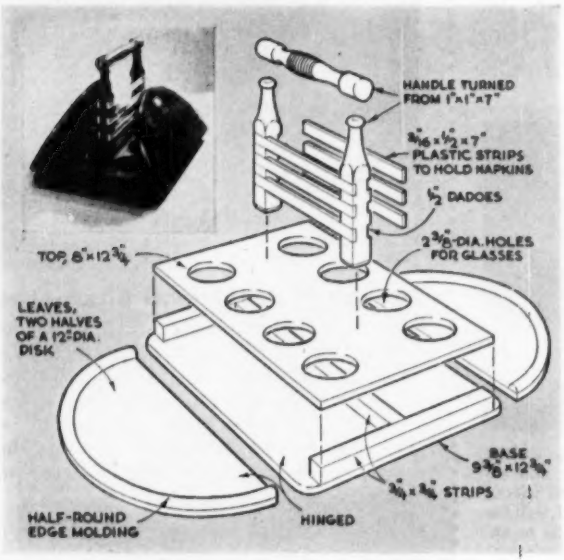


A Trick for Sanding Curves

For a sanding block that will conform to the shape of curved pieces, take a cellulose sponge and wrap the sandpaper around it.—*Hugh Lineback, Stillwater, Okla.*



Folding Tray Is a Work Horse



CARRIED with one hand, leaving your other hand free for serving, this folding tray makes it possible to tote the refreshments and the snacks in one trip. When not in use, it folds and stores compactly out of the way.

The tray was made of ¾"-thick Honduras mahogany, but walnut, maple or even plywood will look as well. It's the styling that makes it desirable.

Glue ¾"-square strips to the base to raise the top so that the glasses can be set into holes bored for them. Cut the leaves from a 12"-diameter disk and hinge them to the base with decorative brass hinges. Glue thin wood strips around the curved edge of the leaves and sand them round to form a bead to keep dishes from slipping off.

Turn the three parts for the handle from 7" lengths of 1"-square stock and dado the two upright pieces for six plastic strips to hold napkins.

Since the tray will probably come in contact with liquids, the best finish to use on it is a coat of spar varnish. It could be finished with enamel, though, to blend with kitchen colors.—*Theodore K. Hastings, Los Angeles.*

Trimming Down an Old-Style Table Gives It a New-Style Look

A LITTLE skillful surgery can turn an old chairside table into an unusual coffee table. The photos at right show an example in the home of A. J. Cutting, of Grosse Pointe, Mich.

After cleaning off the attic dust, Cutting sawed off the upper part of the heavy pedestal to bring the top down to coffee-table height and create a tier effect. Polishing restored the table's original luster.

The Other Fellow's Shop

Workshop overalls are the off-season uniform of Smokey Alston, Brooklyn Dodgers' manager. His specialty? Making furniture for his home.

By George H. Waltz Jr.

WHEN Walter "Smokey" Alston, the manager of the Brooklyn Dodgers, says good-by to Dem Bums this fall, he will put on a pair of overalls and begin a busy season in a home workshop.

Smokey's shop is housed in a separate building near his home in Darrtown, Ohio. It was a fair-sized barn before

he and his father, Emmons "Tobey" Alston, turned it into a shop. Since then, an addition has expanded it to a total of about 1,900 square feet of floor space —more than twice the area of an average two-car garage.

When I first asked Alston about his shop, we were sitting in his office off the players' dressing room under the stands at Ebbets Field. It was just before one of the crucial games in this year's pennant drive. "Oh," he drawled, "it's not much of a shop, I guess."

Then he proceeded to run down this list of motorized tools: tilting-arbor circular saw, bandsaw, jigsaw, jointer, planer, shaper, lathe, large drill press, disk sander, and a big belt sander that he built himself, plus a better than average assortment of hand tools, clamps, and other accessories. Then he paused and added, "Oh, yeah, and I've got a Shopsmith. Gives me an extra lathe, saw, and sander when both Dad and I get going."

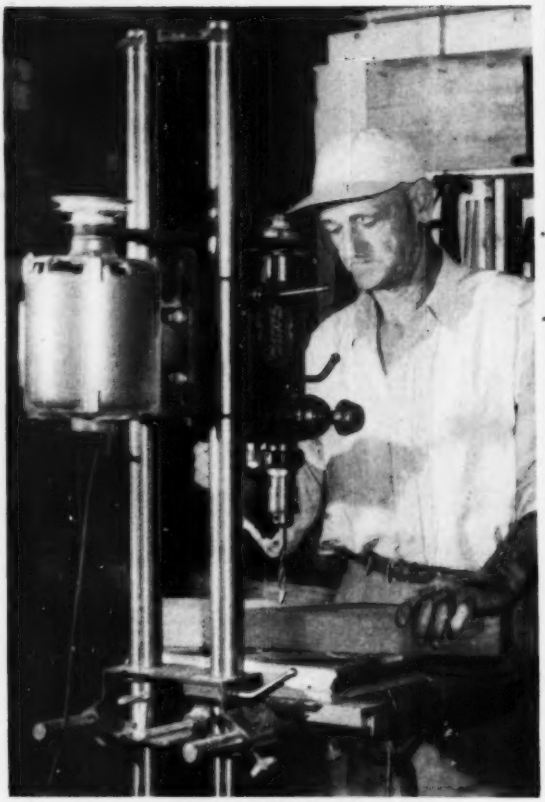
He Was Born with the Knack

Alston has been an avid workshopper ever since he was big enough to wield a man-size handsaw. His father always had a way with tools and Walter followed that lead.

In 1935, when Smokey started playing pro baseball after his graduation from Miami University in Oxford, Ohio, he looked around for something to do during the winter, when he wasn't making putouts at first base for Greenwood in the East Dixie League. Naturally, he turned to shopwork. But instead of working in it, he took a job teaching it, along with high-school science, biology, and physical education, first at New Madison, then at Lewistown, Ohio.

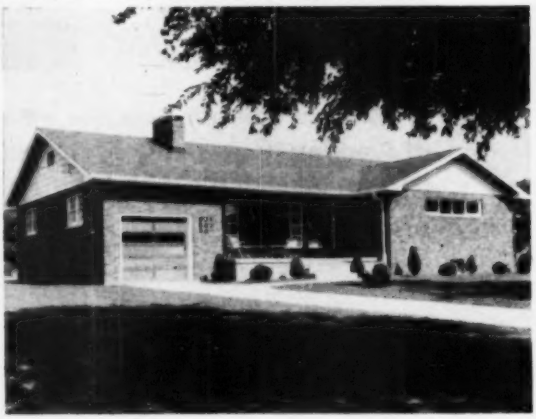
When Smokey began his climb up the managerial ladder in 1947, however, baseball duties soon took up more and more of his off-season time, particularly since his minor-league teams kept winning pennants and figuring in post-season play-offs. Finally, he had to give up teaching. Then he decided he'd just have to have a shop of his own.

In 1950, when Alston became manager



SMOKEY'S SHOP PARTNER is his father, who keeps things humming at home while the Dodger manager is away. The shop boasts this combination tool as well as separate ones.

ALSTON HOME in Darrtown, Ohio, is largely the handiwork of Smokey's father, who did all the brick and masonry work. The bricks are seven different shades, mixed in a regular pattern.



SOME OF THE POWER TOOLS in the Alston shop are lined up here to have their picture made. Smokey and his father built stands for all the tools, using maple reinforced with strap iron. Besides a long list of store-bought equipment, the workshop has a big belt sander that Smokey built himself. If he has any one favorite woodworking tool, it is his lathe.

THE DODGER MANAGER tries his hand at another game, pool, in his home recreation room. All the frames for the baseball pictures on the wall were one of his projects last winter.

SMOKEY MEETS in his shop once each winter with baseball-minded employees of the Champion Paper and Fiber Co. of nearby Hamilton, Ohio. Smokey was born in Hamilton, Dec. 1, 1911.

of the Montreal Royals, top team in the Dodger farm system, he and his wife contracted to have a new home of their own built just across the road from his family's place, where they'd been living. His father supervised the construction, and when Smokey came home with the 1951 pennant for Montreal, the house was ready to move into.

When You Can't Buy It, Build It

There was just one *big* hitch.

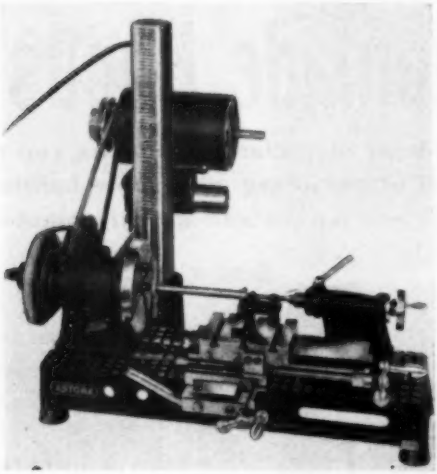
When the bills for the house were paid, there wasn't much left for furniture. So Alston saw that there was only one thing to do—build it. He figured that he could buy the lumber, plus some motorized equipment, for much less than seven roomfuls of furniture would cost. He and his Dad went to work. First, they enlarged the shop. Then the young Alstons went on long "scouting" tours of the furniture stores in nearby Hamilton. When they found a set, or a piece, of furniture that they liked, Smokey took mental measurements and made a few quick sketches of details while Mrs. Alston chatted with the salesmen. Later, back in his shop, Smokey made rough drawings, adding a fillip here and subtracting a detail there. Then he and his Dad began turning the pieces out. Except for a few upholstered pieces, nearly every stick of furniture in the Alston home today is homemade.

Naturally a baseball motif figured in the design of some pieces. The benches and low tables for his recreation room, for instance, have baseball bats for legs.

Luckily, Smokey's and his father's woodworking interests are different. As he puts it, "Dad likes to do the heavy work, the ripping and the roughing out. He just loves to make sawdust and get things finished in a hurry. I'm the putterer. I like to put on the finishing touches. Anyway, together we make a darned good workshop team, and always have." END

DINING ROOM in the Alston home is furnished completely with furniture made by Smokey and his father. Dining table, chairs and writing table are solid oak. Desk in far corner was built of walnut taken from old barn. Smokey turned the lamp base from walnut and maple.

New Tools

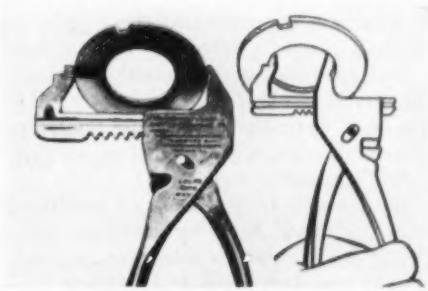


1. Machine Tool Does All Jobs. Small enough to fit on a kitchen table, this Swiss-made tool is a complete machine shop in one package. Basically a combination lathe and milling machine, it comes with more than 100 accessories. The tool can be quickly changed over to perform many different types of machining jobs, such as jig boring, surface grinding, thread cutting, milling, slotting and turning.

2. New Mikes Speed Measurements. You can read measurements directly in ten-thousandths of an inch on the micrometer at left below, saving the time and fuss of a vernier scale. It also has a spring-loaded spindle that automatically puts proper pressure on the work so you don't have to make delicate adjustments by hand. The mike at right can be quickly fitted with round or flat anvils for measuring in holes or slots where other anvils won't fit. By removing the clamping jaw that holds the anvils, it also serves as a height gauge. Both tools have a range from 0" to 1".

3. Level Keeps Drill on the Beam. You can drill holes accurately at any angle with this level attachment. Just set the pivoted bubble cup to the desired angle and keep the bubble centered. The two-directional level, which is strapped around the tool's housing, also keeps the drill going straight in the side-to-side plane.

4. Paints Stripes. Interchangeable wheels for this new paint-striping tool let you make up almost any width of line for decorating fabrics, furniture, models and other materials. Wheels come from 1/64" to 1/8" thick and can be used in pairs with spacers to give any combination of double lines.



5. Pliers Grip Inside or Outside. Holding washers, pipe, or bearings from the inside is easy with these convertible pliers. A removable geared jaw is simply slipped out of one side and inserted in the opposite one, reversing the action so that the jaws open up instead of closing.

Further information on the tools shown on this page can be obtained from: 1. Machines Ltd., 822 N. Hollywood Way, Burbank, Calif.; 2. L. S. Starrett Co., 101 Crescent St., Athol, Mass.; 3. M & J Specialty Co., Red Hook, N. Y.; 4. Wendell Mfg. Co., 4234 N. Lincoln Ave., Chicago 18; 5. American Plierench Corp., 4611 N. Ravenswood Ave., Chicago 40.

Mystify your family and friends with

Homemade Hocus-

A professional magician introduces you to the fine art of conjuring with some baffling tricks that any novice can quickly master.

1 HALF-DOLLAR VANISHES in effective bit of amateur magic. "I'm going to take this coin and put it here in my left hand," you say, flipping it into air. You miss the catch, and the coin "accidentally" bounces from your hand, as above, and falls to the floor. "Oops, sorry . . ." and you stoop as if to pick it up, going right on with your spiel meanwhile.

2 SECRET OF TRICK is that you only *pretend* to pick up coin. To get away with it, hold up other hand and focus attention on it by talking about it. Turn each side and point out it is empty. A joke aids the misdirection: "Of course," you quip, "the hand is completely unprepared and has no trap doors or detachable fingers."

IN EVERY conjurer's bag of tricks there are a few that anyone could do without practice, if he only knew the secret. From my own repertoire I have taken those that follow. You can make the simple accessories needed, and learn to perform them, in half a day.

Perhaps you have supposed that sleight-of-hand performers baffle you because "the hand is quicker than the eye." Actually most magic depends, not on speed, but on misdirection—the art of making you look the wrong way at the right time.

My favorite trick uses pure misdirection to make a coin disappear. As if by accident, you drop the coin. Divert the spectator's attention as you reach down for it, and you keep him from seeing you only pretend to pick it up. Thus you have created the illusion that the coin is in your hands. Show they are empty, and it "vanishes."

Once you know the secret, does this seem too transparent to fool anyone? Don't be misled. In eight years as a professional magician I have performed this trick thousands of times without once being detected! So can you, if you follow the directions on these pages.

How can so simple a deception succeed? Note its timing. When you drop the coin and feign retrieving it, an onlooker suspects nothing because he thinks your

3 AS IF YOU HAVE COIN in right hand when you stand up again, feign transferring it to left hand, which you close tightly. Opening right hand, you show it is empty, "proving" you put coin in left hand. Actually it is still on floor, but gestures with hands have drawn attention from it. To conceal it, step on it casually, without looking down.

Pocus

By Tom Gaston

4 NOW THAT ONLOOKER is convinced your left hand holds the coin, you say, "So you can be assured that I do not use my sleeves, will you please just hold my wrist throughout the trick?" You make a show of grinding your fingers against your palm, as if you were crushing the coin into nothing.

5 COIN IS GONE! Open one finger at a time. Spectator above thinks others may hide coin, until all are raised. Give her time to start wondering about the back of your hand, then show it to her.

trick has not yet begun. By the time he watches you closely, and holds your wrist, he's already been tricked. And you take care not to tell him beforehand that you will make the coin vanish. That is the first rule of magic: *Don't reveal in advance what you are going to do.* For all the spectator knows, the coin may change color, become an egg or sing a song; its disappearance catches him off guard.

He will begin looking for an explanation, but the coin is safely hidden beneath your foot. Go on to another trick, or wait and give him a few minutes to forget all about your having dropped the coin. Then offer to tell him how you made it disappear. You flipped it into your sleeve, you say, before you let him grasp your wrist.

"It passed up my left sleeve," you explain, "across my chest, and down my right trouser leg into my shoe. You look as if you doubt me. I'll prove it." You snap your fingers. "The coin has now passed through the sole of my shoe, and is under my right foot." Wait for him to challenge you. He will, in short order. "You still don't believe me? Watch closely." Slowly you draw back your foot and reveal the coin lying there. Just watch the bewilderment on his face!

For a baffling pocket trick, pry loose the bottom of a

Here's another way to make a coin vanish:

DISAPPEARING DIME, held between thumb and forefinger *(a)*, is tethered to middle finger by invisible loop of hair. Flick of fingers throws it to back of hand *(b)*, where it hangs out of sight *(c)* while audience is shown empty palm. This is called flash magic.

drum-shaped thumbtack box so that it slips on and off just like the top. Steam the label off the top, or paste an identical one on the bottom, so that top and bottom look exactly alike. Glue two small corks inside one of the lids, making sure that no glue shows. Put two similar corks in the box, loose; fit on both lids, and you are ready.

Lift the lid to which the corks are glued. The two loose corks are seen. Close the box, blow your magic breath on it, lift the lid again, and the two corks have become four! Repeat the act, and again there are only two corks. Of course, you have secretly turned over the box each time.

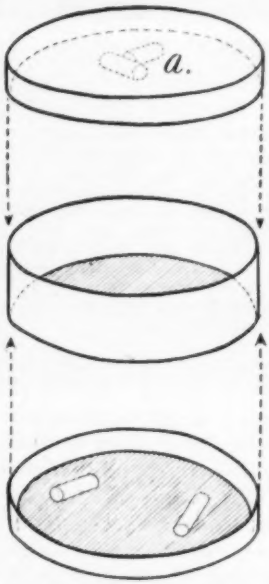
Go through this sequence only once. For the second rule of magic is: *Never do the same trick more than once in an evening.* Learning what to watch for, a spectator might catch on. Put the cork trick in your pocket before anyone thinks of asking to examine the box, and go on to another stunt.

For instance, announce that you have a "sex indicator," that will tell the sex of a person whose palm is beneath the device. You produce a small object tied to an eight-inch length of thread—I generally use a toy skull or horseshoe, but a finger ring or pebble would do as well. Hand it to someone in the group, instructing him to hold the loose end of the thread and let the small weight swing freely like a pendulum. Tell him that over a man's hand, it will swing straight back and forth; over a woman's hand, it will describe a circle.

Strangely enough, so it will! Knowing what it's supposed to do, the man holding it will *subconsciously* swing it just as you have described. He'll swear in all honesty that he is not doing it deliberately, and will be the most amazed person of all.

Or try this quickie stunt at a party: There ought to be confetti for the occasion, you say, and you'll see what you can do. You reach upward, rub your fingers together, and multicolored confetti floats through the air!

To prepare the trick, make a hole as large as your finger in each end of a white egg. Blow out the contents, wash the shell thoroughly with bright-colored dye or water color, and let it dry. Fill it with colored confetti and paste red tissue paper over the holes. When ready, drop it in your sleeve.



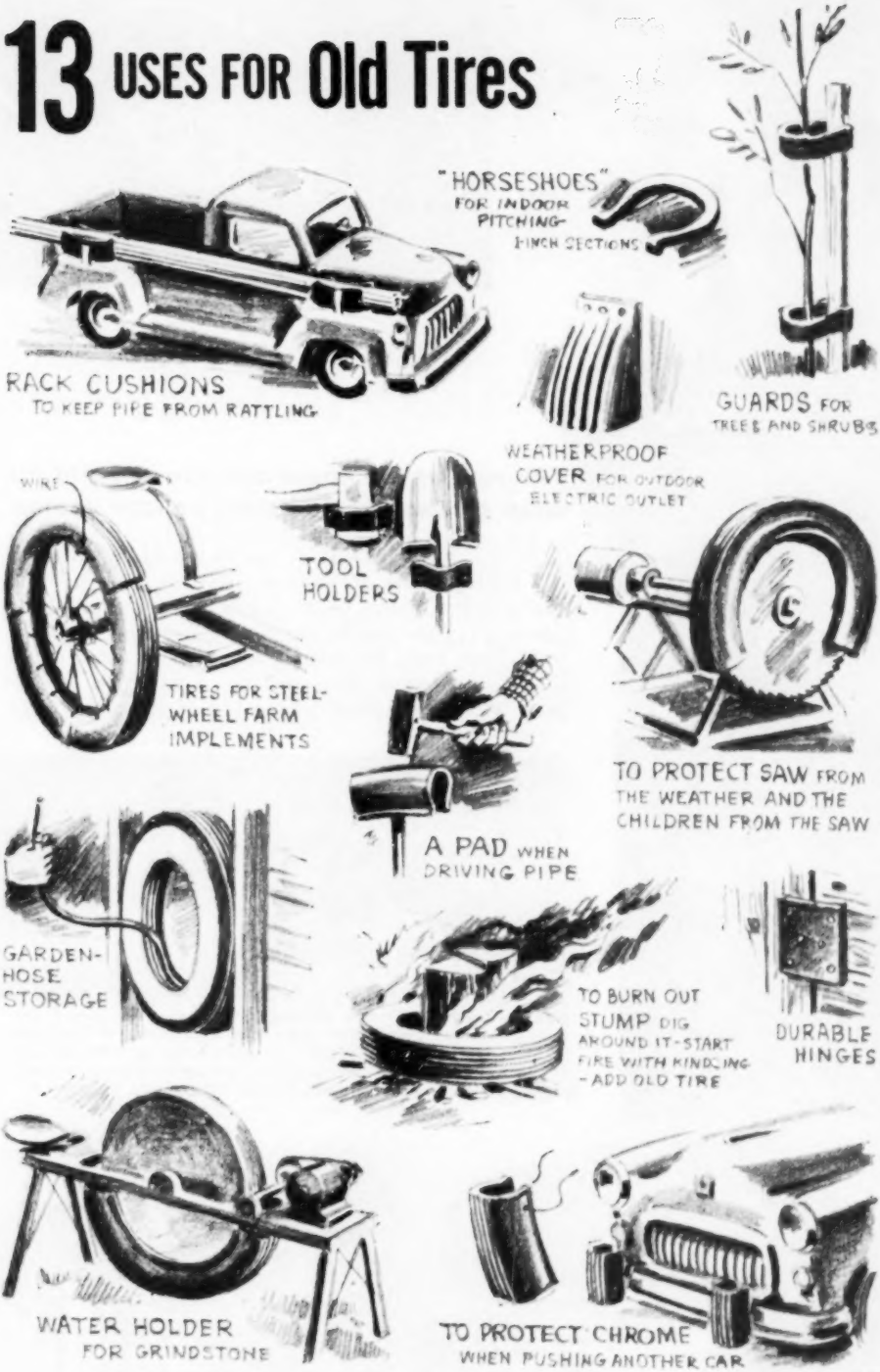
MAGIC CORKS become two or four at will, in this thumbtack box with a loosened bottom. Two corks are glued at *a*; two others are loose. How many the spectator sees depends on whether you lift top or bottom lid of box.

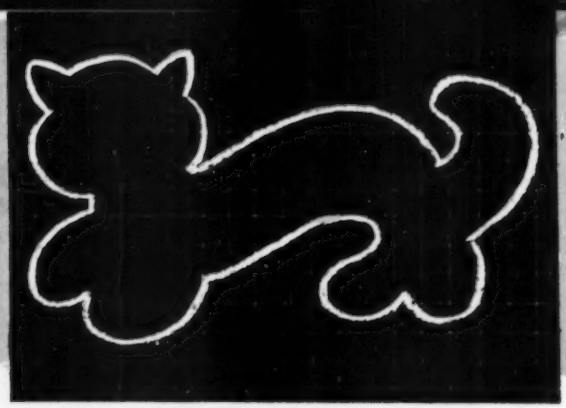
Show your hand empty. Then drop it to your side while you are talking about confetti, and the eggshell falls into your waiting fingers. Keeping it hidden behind your hand, reach into the air and pretend to grab something. Gaze intently at your upraised hand, crush the eggshell with your fingers, and let the confetti stream past their tips. Since the pulverized shell falls to the ground with the confetti, your hand will be empty.

Tricks in which objects appear and disappear without any covering handkerchiefs are called "flash magic." Here's a flash way to make a coin vanish. Make a loop of a six-inch strand of human hair. Stick the ends to a coin with wax. Insert your middle finger in the loop. Show dime held between thumb and forefinger. Quickly flick coin between fingers. Then spread them wide. The coin drops from sight behind your hand. To an onlooker, it just vanishes. END

Next month: You'll read how to make cigarettes that smoke themselves.

13 USES FOR Old Tires



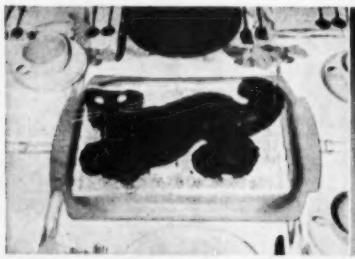


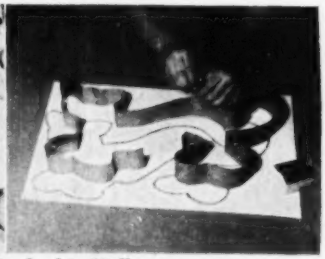
How to Help Bake

The man of the house can use some of his shop techniques to adorn holiday tables.

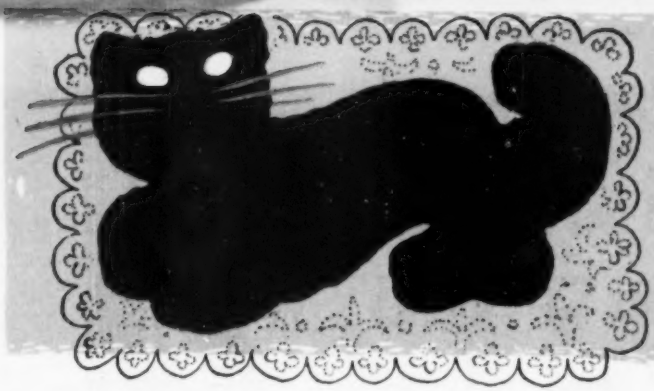
NO SELF-RESPECTING spook would be without a black cat on Halloween. The one shown being made in the photos below is just the thing to spark a party for little spooks or treat a gang of tricksters.

You can form the mold, made of bent metal strips, in a few minutes, then turn the baking job over to your wife. The pattern at the top of the page, when





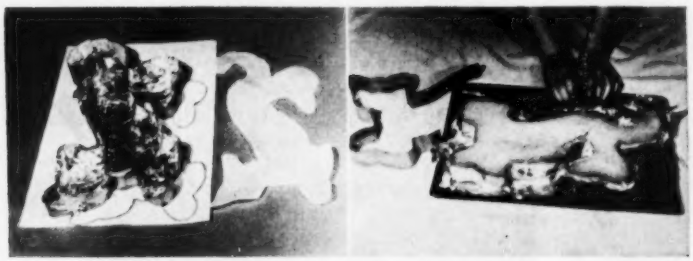
SMALL GOBLINS BEWARE: Chocolate-iced, this Halloween cat-cake is ready to prowl. Use white jelly beans for eyes—red ones for an especially mischievous cat—and toothpicks for whiskers. Tin strips 1½" wide are bent to outline drawn on squared paper. Overlap ends 2" and fasten with paper clips.



a Halloween Cake

scaled up to 8″ by 15″, takes just one box of cake mix. It can be made larger or smaller as desired.

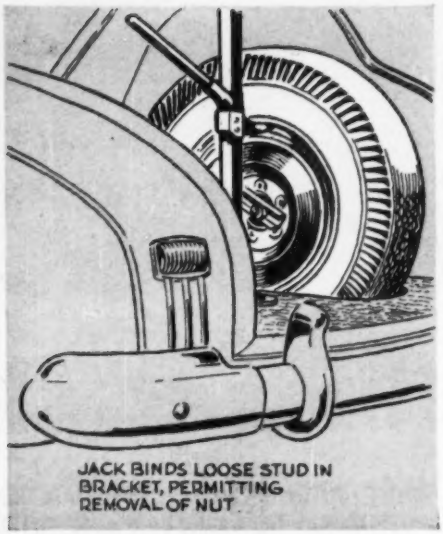
The same method can be used to make the witch's head, owl and pumpkin, as well as decorative shapes for other occasions, such as Santa Clauses and stars for Christmas, eggs and bunnies for Easter. One caution: keep projecting parts—arms, legs, tails and such—fairly thick to prevent part of the cake from burning before the rest of the batter has baked.—*Earl Seidlinger, Columbus, Wis.*



LINE SHAPE with aluminum foil, pressed in tight. Then cut wax paper to outline and lay in bottom to prevent sticking. Set on cookie sheet and fill with mix. When cake is cool, peel off tin strips carefully to keep it from crumbling. Turn the cake over to remove the foil and wax paper.

Use a Fork to Speed Nailing

HERE's how to grab a handful of nails quickly on the job instead of fumbling in a prickly sackful of them. Dump the nails into a cake tin. Then scoop them out with an ordinary fork, shaking off any loose ones. Take the rest off the fork with your other hand, heads up and ready to drive. To pick up the larger nails, just bend the tines apart slightly.—*Elbert Robberson, Port Washington, N.Y.*



Motorist Uses Head in Pinch

MILES from nowhere, with a flat tire, I found the locknut on the spare wheel frozen to the stud *and the stud loose in the bracket.* Both parts turned when I tried to loosen the nut. I placed the jack against the spare wheel and forced it up until the side pressure jammed the stud in its hole. Then I removed the nut with the only other tool I had—the lug wrench.—*William B. Askew, Norfolk, Va.*

Lift Eases Auto Wheel Off

CHANGING a wheel on your car is made easier with this forked lift. Leverage does the work. Bend a four-foot length of ⅝" rod in the middle, making a vee with the ends 16" apart. Place it under the jacked-up wheel, raise and ease it off.—*Ivan Grosvenor, Indian Rocks, Fla.*

Tear Tape for Better Joint

YOU can insulate wires better and save tape besides by using half-width strips. Tear the tape lengthwise. Wind on one strip to cover the bare wire. Then wrap the other strip on in the opposite direction over the first.—*Glen F. Stillwell, Manhattan Beach, Calif.*

How to Winter Your Outboard

"Take her up tenderly," counsels Lindsley. "Handle her like a lady and she'll purr amiably."

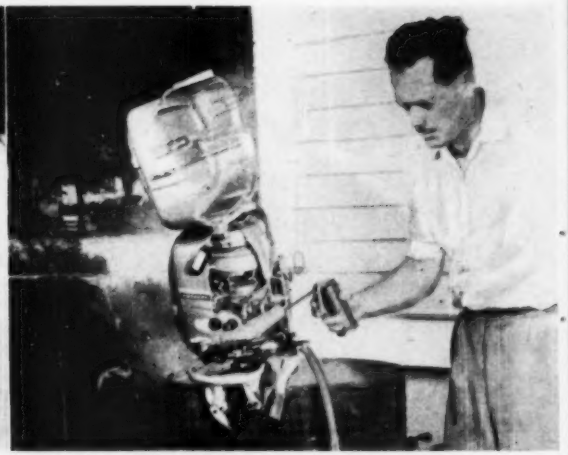
A kicker that's lovingly lulled into hibernation will wake up eager to kick off next spring.

By E. F. Lindsley

POUND for pound, an outboard motor probably packs more punch than any other piece of equipment you may own. Generally it also puts up with worse conditions—in storage as well as in use—than any other power plant. The guy who gripes loudest when his kicker turns temperamental is most likely the same character who lets the motor clunk about in the car trunk until the snow flies, then

ABUSIVE TREATMENT is to dump a motor in basement and ignore it for months. And a garage is worse. To see better treatment, turn page.

FLUSHING cooling system may not be essential on new jobs, but it can't hurt and may help.



"SLUGGING" running engine with oil in intake is a new method to prevent internal rusting.

dumps it in the garage or basement to be ignored until next spring's opening day.

A garage is seldom a good place to store an outboard. Freezing temperatures, dust that swirls in on March winds, careless bumps from the wheelbarrow or bicycle—all make the garage a bad deal. The basement, too, comes in for some frowns from the outboard manufacturers. Mentioning dampness, dust, and condensation, one maker says, "no sportsman would do such a thing with his guns or fishing rods." The ideal spot, provided a pact can be negotiated with the lady of the house, is the back of a closet. Failing that, settle for the attic.

Handle with care. Good outboard practice, summer as well as winter, starts with the way you lift the motor free of the boat transom. *Not* recommended is a weight-lifter's "one-hand snatch," in which the motor is hauled abruptly from the water and dumped without ceremony in the car trunk—power head down—together with sundry fishing gear and a case of empties. Such action, usually accompanied by ballet gyrations to keep the snatcher from falling overboard, can do real damage. What happens is that water retained in the cooling and exhaust passages can then run into the cylinders. Rust starts fast, much faster than the engine will next time.

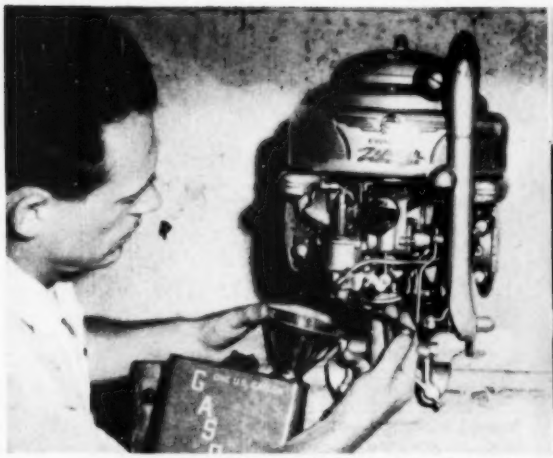
Help your motor out of the boat as you would your girl friend. Set it gently on the skeg and give it a chance to drain dry. If it's going in the trunk of the car, place it with the power head higher than the prop to capitalize on the established reluctance of water to run uphill.

Before storing. The experts don't agree on the need for flushing out cooling systems. The engineers at Evinrude (I've checked with the boys at several of the big factories) say that they've gone to a lot of pains to protect outboard metals against salt water. From the viewpoint of salt-water corrosion, you don't really *have* to flush out a reputable motor of late vintage.

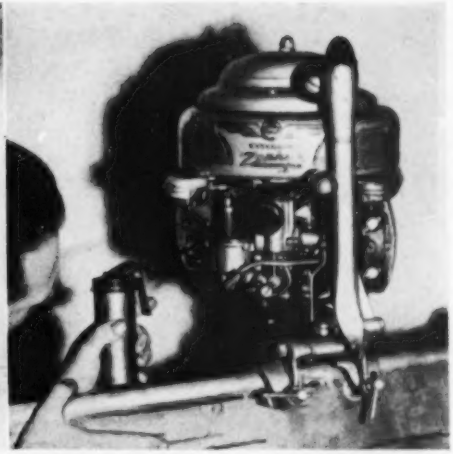
"Yes, but," says Armand Hauser, V.P. of Mercury Motors, "there's a lot of junk in some fresh water—corrosive industrial wastes, minerals, decayed organic matter—that no treatment is going to stop forever."

In any event, Evinrude too provides a flushing plug, so you can force fresh water through the cooling system, and I use it. A brief run in a drum of drinking water will do the job as well.

Engine hygiene. A few years back, most motors had automotive-type bearings, and pre-storage practice was generally confined to squirting some oil in the spark-plug holes and then pulling the



EVERY DROP of fuel-oil mix must be drained or gummy residue may plug up the carburetor jets.



SQUIRT OIL in spark-plug holes and spin engine, provided you don't use "slugging" technique.

engine through for a few turns. With newer needle, roller and ball-bearing models, this is probably adequate under good storage conditions, and it is currently specified in owner's handbooks.

Some manufacturers, however, are considering changing their recommendations to call for "slugging" the engine with oil through the air intake while it is running. This will do no harm, beyond possibly fouling the old plugs that should be replaced next year anyway, and is standard practice for industrial engines before shipment or storage. It is also an excellent idea with four-cycle engines, where valve stems and guides need consideration.

The trick is to introduce a fine stream or spray of oil into the intake until the engine chokes down, at which point you quickly stop it for the year. If you decide to do this in a back-yard barrel, by all means do it in a metal drum. A friend of mine tried to run a racing motor in a wooden-stave barrel that disintegrated spectacularly during the trial. Darn near chased him out of the yard before he got it shut off.

No gas at all. Never leave any fuel in the tank, filter, or carburetor when you put a motor away. Gummy deposits are sure to form that will plague you next season. It's a good plan not only to drain

GEAR CASE should be purged of old grease and water by squeezing in some fresh outboard lube.

the gas-oil mix but also to slosh about a little pure gas and drain that thoroughly too.

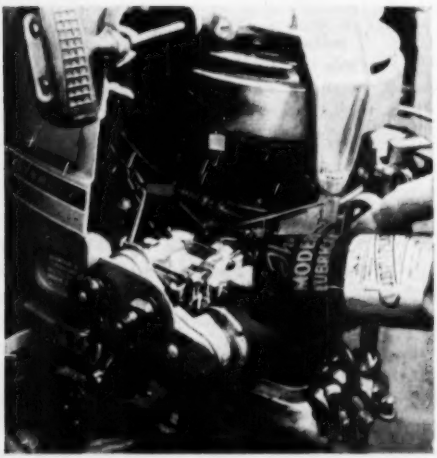
Like any other water-cooled engine, your outboard can freeze up expensively in a cold snap. This doesn't mean that blue-nosed duck hunters must fill the lake with antifreeze—there isn't any possibility that a motor will freeze while running—but it is obviously important to get rid of the water inside right after a cold-weather run.

Most freezing damage doesn't occur to the guy who braves frosty winds with his

NEWER MOTORS often use hypoid lube in lower unit, and are serviced like a car. Left, old hypoid lube and water are drained. Then new lube is squirted in to level of filler plug.

boat, but to the man who takes his winter sports from TV and who leaves his motor half full of last summer's water in the garage. Quite often he lets the water drain out of the cooling system but completely forgets the water that seeped into the lower-unit gearbox. Fractured castings will remind him, come spring.

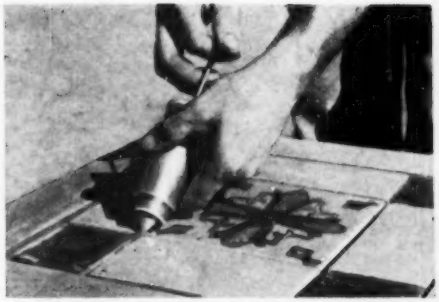
Most lower units have one plug through which you squirt the grease, and a lower plug through which the water and old lube can escape. If your motor isn't particularly new, use a thick outboard gear grease here, not chassis grease. If it's fairly new, and has a gear-shift, it probably needs a hypoid lube. This is thinner stuff, nearer to oil than grease. Pull the lower plug to drain and the upper one to vent; let it drain; add a dollop of fresh to be sure all the old stuff is out; replace the lower plug and fill to the inlet level with fresh lubricant.



GO EASY with complex interacting controls. Gentle wiping and light greasing is enough.

Tempted to tinker? One big advance in recent outboard design has been the ingenious coupling together of spark, throttle, and mixture controls that makes the inherently ticklish two-cycle engine as tame as a kitten. Most outboard engineers pray silently at the thought of owners who may assail this complexity with slip-joint pliers. The best practice here is to keep hands off unless you're very, very sure. Nothing is wrong, of course, with a general wipe-up and light greasing at friction points.

To cocoon or not? Manufacturers' viewpoints differ on whether to seal up a stored engine. In some climates where dryness is the rule and dust storms are a possibility, a sealed plastic bag may be just the ticket. In most of the country, where moisture and condensation are more likely than fine dust, such covering can do more harm than good. A good plan is to store the engine, unsealed, in the best place in the house you can wangle, and to take a look at it occasionally. This also sets up some first-class contemplation on that big old musky you're going back after, next year. END



Cake Decorator Tightens Tiles

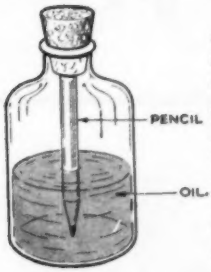
RESET loose decorative tiles quickly by pumping cement into the joints between them with a cake decorator. Add enough water to one part of Portland cement and three parts of fine sand to make a soft, doughlike mixture which can be forced easily through the nozzle.

After filling in the joints, wipe the tiles clean with a damp cloth and cover them with newspaper kept moist for several days.—*R. F. Clothier, Auburn, Ala.*

Hammer Serves as a Mallet

SLIP a rubber crutch tip over a hammer and you have an emergency mallet.—*Marion L. Rhodes, Knightstown, Ind.*

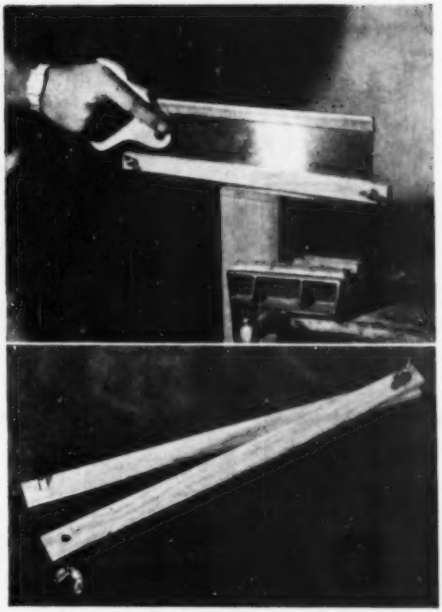
Pencil Puts Oil in Tight Spots



THIS oil applicator, an ordinary lead pencil topped off with cork, will put oil in a hard-to-reach spot. Punch a hole in the cork, insert the pencil and place the cork in a bottle containing oil. Cork seals the bottle from leakage and dirt.

Varnish Rustproofs Screws

WHEN driving wood screws, I keep an oilcan filled with spar varnish handy. After drilling for the screw, I squirt some varnish into the hole. The screw goes in readily and, one year or five later, it will come out clean. Varnish also seems to strengthen the wood around the hole. I have kept an oilcan filled with varnish for as long as two years without its hardening.—*Roger Marsh, Hudson, Ohio.*



Guide Controls Sawing Depth

BETTER than a clamped-on guide, this detachable one made to fit a saw will enable you to cut dadoes, rabbets and tenons accurately to depth by hand.

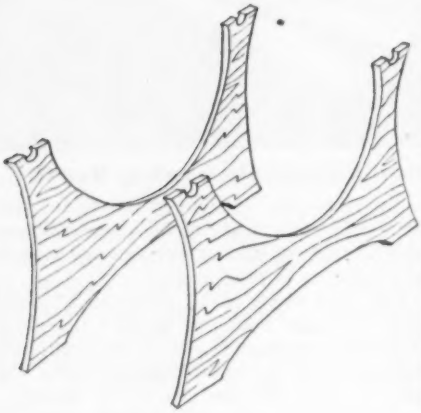
Cut two strips of ¼" plywood ¾" wide and 2" longer than the blade. Clamp the strips together temporarily. Then drill holes through both at once, spacing them far enough apart for the saw to fit between. Leave those in one strip a tight drive fit for the bolts you plan to use. Open out the other holes to slide on the bolts easily. With washers and wing nuts, the guide can be set quickly for any desired depth of cut. —*M. C. Fleming, Pittsburgh, Pa.*

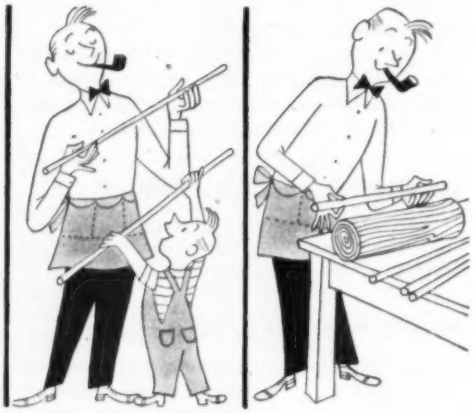
Can Is Soldering-Iron Stand

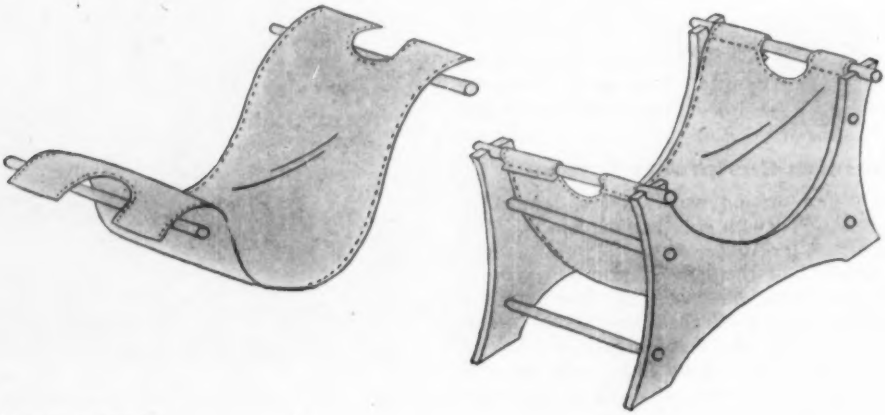
FOR a quickly made soldering-iron stand, bend in the opposite sides of an empty coffee can to form a trough.—*W. H. McClay, Pasadena, Calif.*

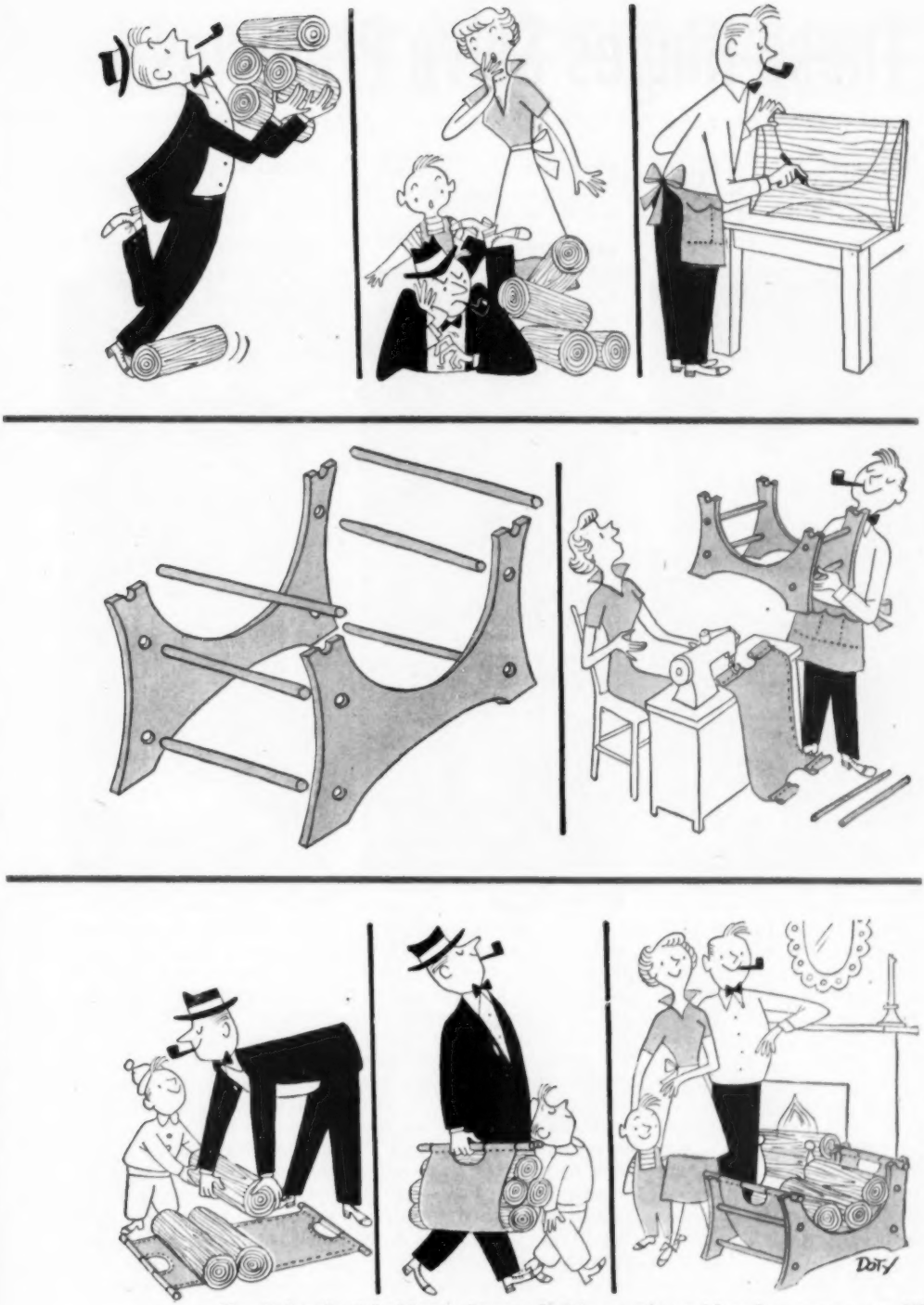
By Roy Doty

Wordless Workshop







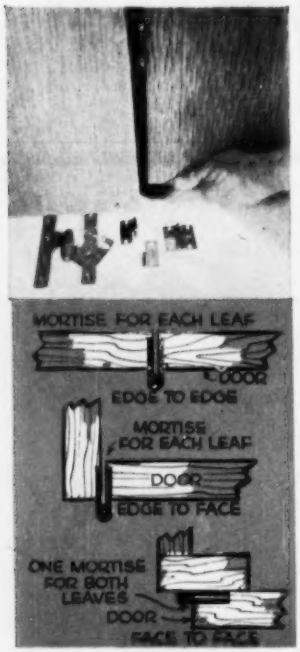


Next Month: A holder to keep a hot iron safe and handy.

These Hinges Solve Problems

Problem: How to hinge a door so that it can be removed instantly at any time.

Hinge: Loose joint.

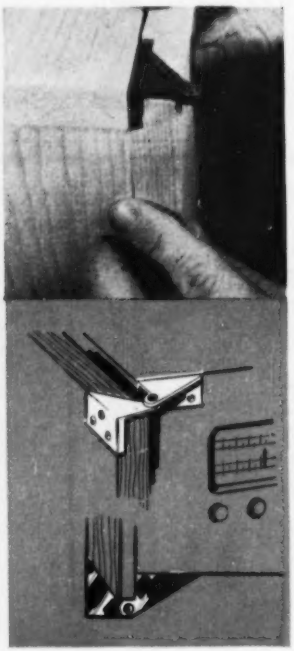


Where to use it: In smaller sizes, this is ideal for cabinet doors that can be lifted right off for easy cleaning or rearrangement of storage. In larger sizes, it will hang a house door. Olive-knuckle type shown gives fancy, modern appearance, but it also comes in flat-button type that looks more like regular butt hinge.

How to use it: Mortise hinge leaves into door and frame, as for butt type (see "How to Hang Doors Faster," PSM, Sept. '54, p. 132). Use two on small doors, three on full-size house doors.

Problem: How to hinge a door inconspicuously on the outside of the frame.

Hinge: Semiconcealed.

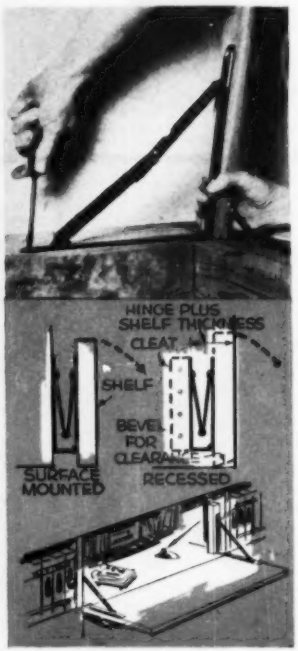


Where to use it: On radio cabinets, dining sideboards and other storage units where doors must cover face and swing back at sides. Made for ¾″ doors, it requires no styles (vertical face strips) to mount on, shows only small outer pivot that lets door open full 270°. If this won't do, try its brother—the semi-invisible knife hinge.

How to use it: Can be face-mounted, but for snug fit should be mortised. Cut mortise in door to depth of both hinge leaves combined, eliminating need for also mortising cabinet frame.

Problem: How to hinge a shelf so that it will be supported when opened.

Hinge: Folding bracket.



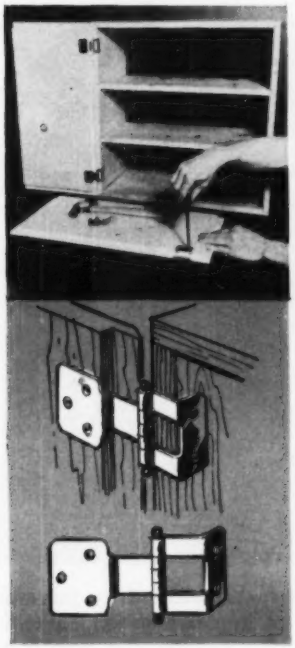
Where to use it: Both a hinge and brace combined, this one makes it easy to mount a drop-leaf desk or hinged serving counter that folds neatly out of the way when not in use. Made in sizes up to 16″, it can also be used to rig up other gadgets, such as a hinged bar of electrical outlets for use in shop or photo studio.

How to use it: For rough construction, simply face-mount as above. To make shelf fit flush with frame when closed, mount brackets on cleats set back combined depth of bracket and shelf.

Special hinges let you do many jobs that ordinary ones can't handle. Here's a handy photo chart that shows you how to use a dozen of the most helpful types. **By Paul Corey**

Problem: How to hang a lipped door without having the hinges show on the face.

Hinge: Semiconcealed lip.

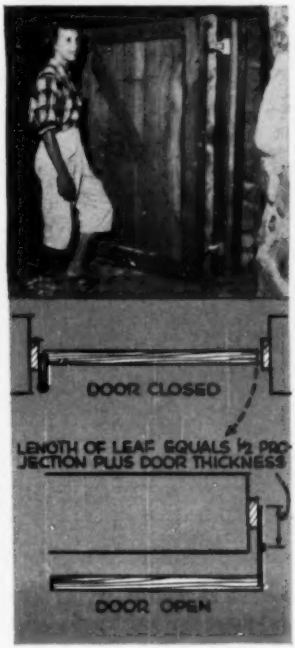


Where to use it: Most often found on kitchen cabinets with lipped doors, but can also be used on other cupboards and clothes-storage wardrobes having doors with rabbeted edges. Usual size is for ¾" door with ⅜" lip. Two types mount either on face of style or directly on edge of cabinets having no styles.

How to use it: Thin leaves usually need no mortising, are simply fastened on with small flathead screws. When using plywood, avoid edge-mounting types that screw into the weak end grain.

Problem: How to hinge a door that will swing open past a projecting frame.

Hinge: Wide-throw.

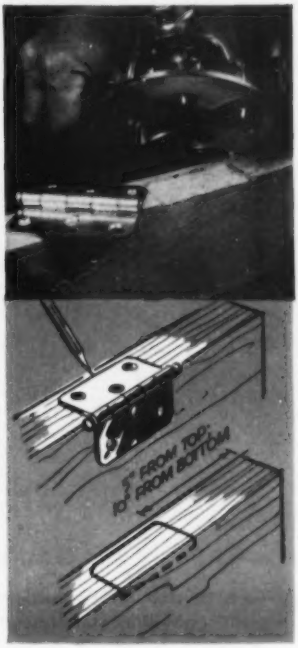


Where to use it: On doors mounted in thick storage or masonry walls, as above. Long leaves carry door outward as it opens, clearing projecting edges. Frequently used on casement windows, it lets sash open wide enough so that outside of glass can be washed from inside. Also found on some folding doors and screens.

How to use it: Usually not mortised, but can be if a tight fit is needed, as on windows. Be sure to measure projection first in order to buy hinge that has proper length of leaves.

Problem: How to mortise a lot of hinges at one time with router instead of by hand.

Hinge: Round corner.



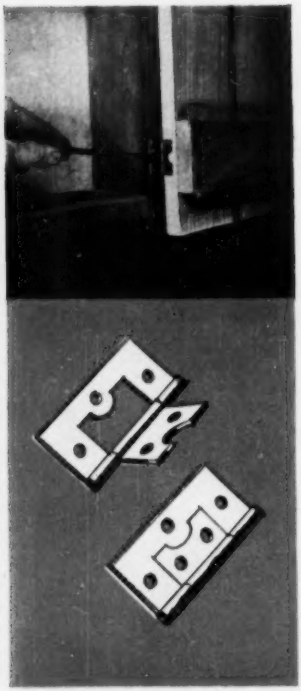
Where to use it: Wherever you have a chance to save time by using a portable router instead of hammer and chisel. Hinges are similar to ordinary butt, but leaves have rounded corners that fit into the round-cornered mortises cut by router. They come in same sizes, styles and finishes as standard butt hinges.

How to use it: Trace leaf shape on door edge with pencil, set router bit to proper depth, and follow outline by eye. If you're setting many hinges, special template makes work even faster.

Please turn the page for more hinge photos.

Problem: How to hinge a door without doing any mortising at all.

Hinge: Nonmortising.

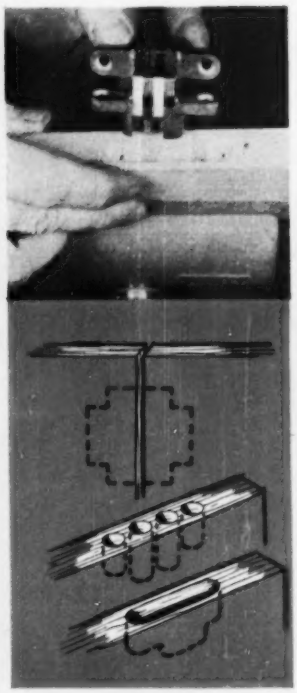


Where to use it: For neat, close-fitting doors wherever a butt-type hinge will do the job. Leaves fit inside each other instead of overlapping, reducing gap between door and frame to thickness of only one leaf instead of two. Made primarily for small, light doors such as on cupboards, hinge comes in several sizes and in most of the same finishes as standard butts.

How to use it: Hinge is surface-mounted on style or frame as in semiconcealed type. Though it gives appearance of a snug fit, remember it is not a substitute for mortised hinges on doors or windows that must be weathertight.

Problem: How to hang a door so that you can't see the hinges.

Hinge: Invisible.

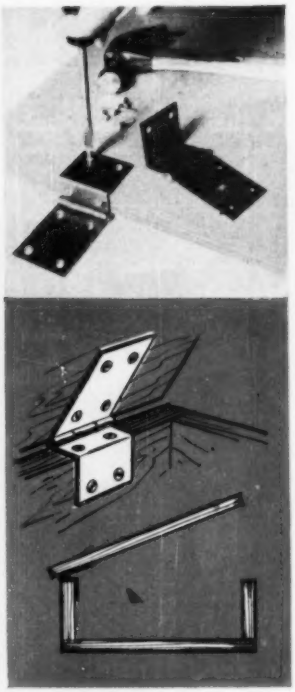


Where to use it: Especially good for fine cabinetwork or on modern flush doors where hinges would detract from their clean appearance. Working parts are mortised into door and frame so that hinge is completely concealed when door is closed. Sizes range from very small for light doors to heavy ones for full-size house doors. They also come in wide-throw types to clear projections.

How to use it: Most common type shown requires drilling four holes for each half, then cleaning out waste with chisel. Two screws then hold each half in mortise. For quick hinging of light doors, use small round type that needs only two ½" holes.

Problem: How to hang a door on an edge that's too narrow for a hinge to hold.

Hinge: Chest.

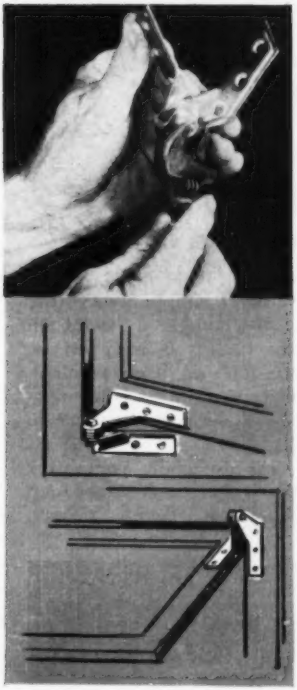


Where to use it: To fasten a lid to a thin-walled chest or a door to a cabinet wherever the edge is either too narrow or the grain too weak to mount an ordinary hinge. Especially good for cabinets having no styles and for fastening to plywood, since the bent leaf screws to the face of the wood as well as the edge. It comes for wood ½", ⅝", ¾" and ⅞" thick.

How to use it: For a close fit, hinge should be mortised into wood where it laps edge but not on face. On chests where hinges won't show, no mortising may be needed. Hinge can be installed with bent leaf part mounted on either door or frame, depending on which is weakest.

Problem: How to hinge a door or window so it will stay open at any point.

Hinge: Friction.

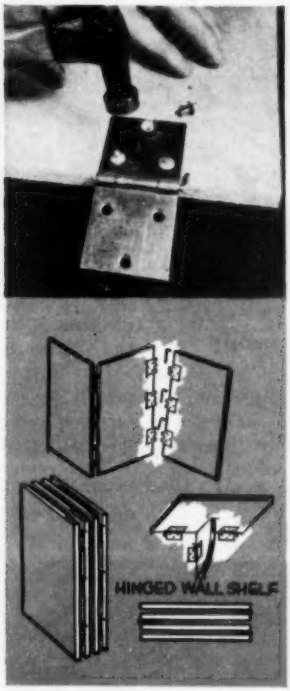


Where to use it: On cellar windows, porch screens, greenhouse and summer-cabin sash—anywhere you want to open a window and have it stay put. For controlling house doors, there is a friction-type butt hinge. Some semiconcealed hinges are also made with friction-adjustment washers so that radio-console and other cabinet doors can be held open at any desired point.

How to use it: Type shown above for small doors and windows is simply surface-mounted without mortising. For friction-type butt hinges, mortise leaves into door and frame as for ordinary butt. Tightening nut at pivot sets desired amount of tension.

Problem: How to hinge door sections so they can be quickly taken apart.

Hinge: Bent loose pin.

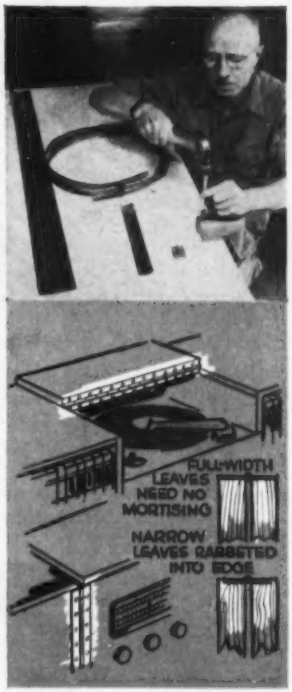


Where to use it: Pull out the easy-to-grasp pin and the two halves of this hinge come instantly apart. Good for sectional doors, folding screens, and take-down furniture, it's almost as fast to disassemble as the loose-joint hinge, yet can't come apart by itself. Because of its quick release, it's often used as a removable shelf bracket, even where hinging isn't required.

How to use it: Face-mount without mortising. On panels too thin to take screws well, use drive rivets as shown above. Hammering pin into rivet spreads slotted barrel, locking it tight in predrilled hole. Pin will enter either end of hinge.

Problem: How to hinge long panels together without using many separate hinges.

Hinge: Continuous or piano.

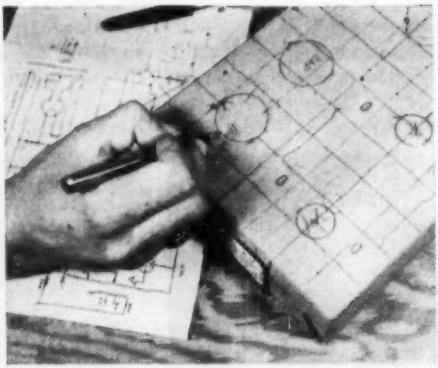


Where to use it: A neat answer to the plywood problem, the continuous leaves add great strength and also conceal the rough, hard-to-hide edges. In brass or chrome, it adds a striking decorative touch to radio, record or buffet cabinets. Individual hinges can also be made from scraps by hacksawing small sections and flattening pin ends with nail set as shown above.

How to use it: Often surface-mounted, but can be easily mortised by simply rabbeting entire length of pieces to be hinged. Or you can buy one that's the exact width of the lumber used, covering the entire edge and eliminating mortising. END

Bottle-Top Corks Pad Lamps

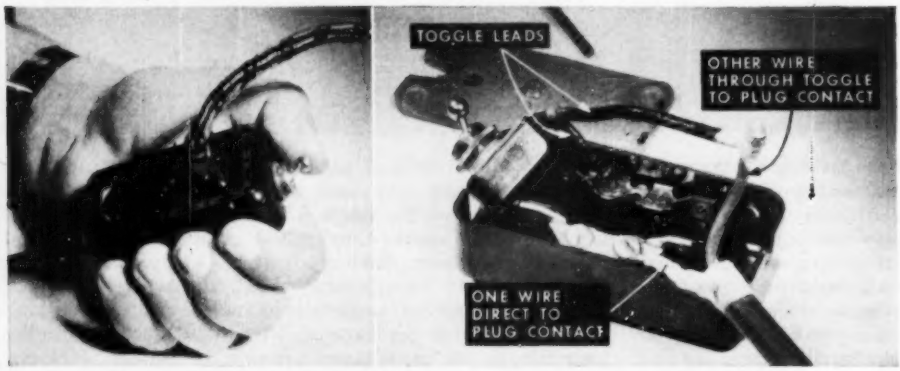
PRY the thin cork inserts out of bottle tops and glue them to the bottoms of lamps, vases and bric-a-brac. They will help protect your furniture from scratches that are likely to occur whenever the objects are lifted for dusting and then set down again.—*B. D. Phillips, Los Angeles.*



Tip for Laying Out a Chassis

KEEP the chassis neat and clean next time you build a radio, amplifier or other electronic gadget by making a layout on the paper that the chassis is wrapped in. When a final decision has been reached, punch through the paper to mark the centers and carefully remove it for reference in hole sizing.

This dodge works especially well on a chrome-plated chassis that won't take pencil marks.—*Phil McCafferty, Naches, Wash.*



Add a Convenient Shut-Off Switch to an Extension Outlet

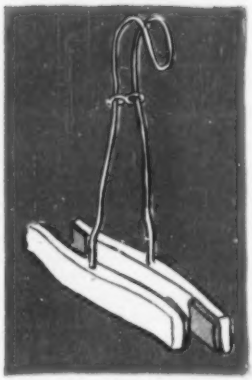
THERE'S plenty of room inside most extension outlets for wiring in a toggle switch as a convenience in shutting off a soldering iron or other tool. Run one leg of the extension wire directly to either of the plug contacts in the outlet and connect the other leg to one lead on the toggle. Run a short jumper from the other toggle lead to the remaining outlet contact. This way, no current will flow through the outlet when the switch is turned off.—*Gus Hall, Brooklyn, N.Y.*

Reversed Hacksaw Blade Does a Better Cutting Job on Tubing

TRY reversing a hacksaw blade in its frame when you cut tubing or thin sheet metal. You'll find that pulling on the blade with the teeth pointing toward you gives better control and smoother cutting action.—*John D. Bell, Berkeley, Calif.*

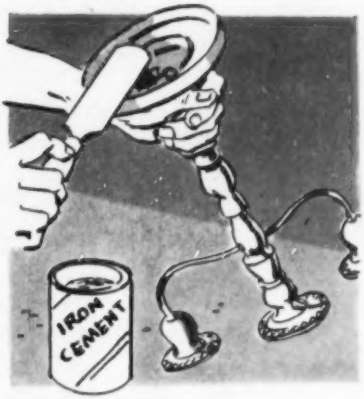
KEEPING THE Home SHIPSHAPE

HARDWOOD FLOORS help insulate a slab-on-ground house. You can lay strip flooring right over concrete if short lengths of two-by-fours, called screeds, are first secured to the slab.



A TROUSERS HANGER that has lost its grip can be tightened by sticking auto weather stripping along each jaw. The foam-rubber stripping comes with the adhesive already on it.

SCRUB SMOKE STAINS on fireplaces with 1½ pounds of caustic soda mixed with a gallon of hot water in a galvanized pail. Apply with scrub brush and don't splash over paint. Rinse bricks at least twice with clear water.



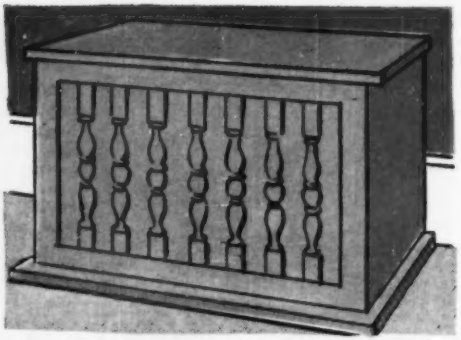
FOR A FIRMER FOOTING, weight a metal candlestick having a hollow base by filling it with a stiff putty of iron cement. Be sure that the fill has been scraped perfectly level before you put it aside for hardening.

PACKING TO MOVE? Tear a strip from a corrugated box to store screws as you remove wall racks and other fixtures. Label the screws for selection when you reach the new house.

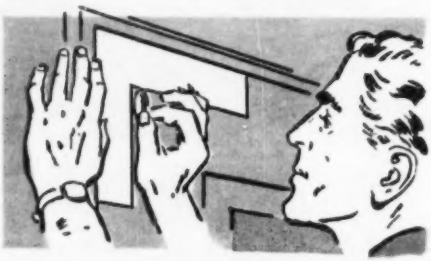
Please turn the page for more home tips.

More Home Tips

A GOOD-SIZE CARRIAGE BOLT—a ¼- or ⅜-incher—is a good tool for neatly countersinking nails in dry wall construction. Place the rounded head of the bolt on the nail and tap the threaded end lightly.

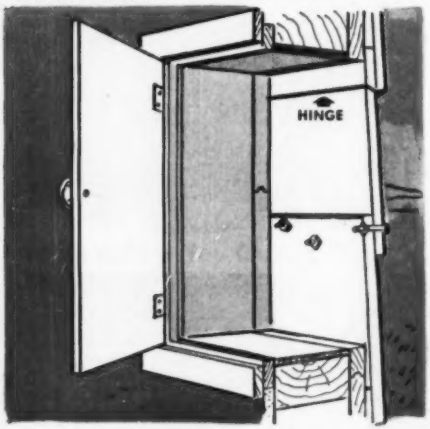


BOX IN A RADIATOR handsomely with balusters from a house wrecker. Split the rails and insert them in a wooden frame with metal window screening behind them. Add a marble decal to the top.

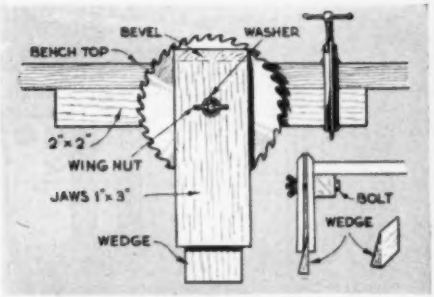


USE A SQUARE that has been cut from cardboard to get window fixtures on the level and uniformly spaced the next time you have to put up curtain or traverse rods, window shades or Venetian blinds.

MONDAY'S WASH hung on two lines stretched taut between leaves from an old car spring will never sag. Rope holes can be burned into the leaf ends with an acetylene torch.



A MILK CHUTE is almost invisible to the eye if the outer door is covered with clapboard or siding to match the house and hung to lift upward on an unseen piano hinge.



No Chatter in This Saw Vise

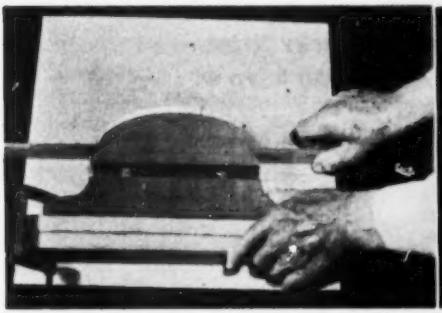
THIS vise grips a table-saw blade near the teeth at the top where you do the filing, eliminating the squeal that often results when a file is passed over a blade sandwiched between two disks of wood.

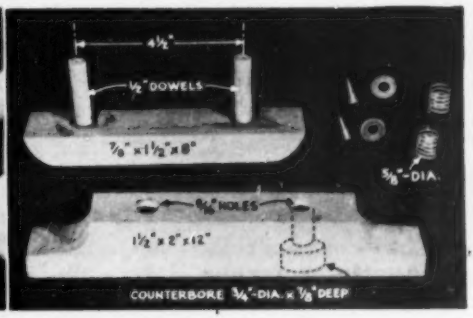
Screw stationary jaw to a short piece of two-by-two and drill through both parts for a 7/16″ bolt, on which to mount blades with ½″ holes. Make the front jaw the same size as the rear jaw and drill a ½″ hole in it to fit over the 7/16″ bolt. Bevel the top edge of both jaws for easy filing.

Clamp the vise to the underside of a workbench, slip the saw blade on the bolt and place the front jaw over it. Insert a wedge between the jaws at the bottom and tighten the wing nut to close the tops of the jaws tightly on the blade. Loosen the wing nut slightly to rotate the blade.—*F. E. Snapp, Sarasota, Fla.*

Funnel Weighs the Bird

IT'S a snap weighing a chicken in a funnel attached to a spring scale. The bird is slipped into the funnel without injury. To figure the correct weight of the bird, subtract the weight of the funnel.—*Charles L. Stratton, Hollis, N. H.*

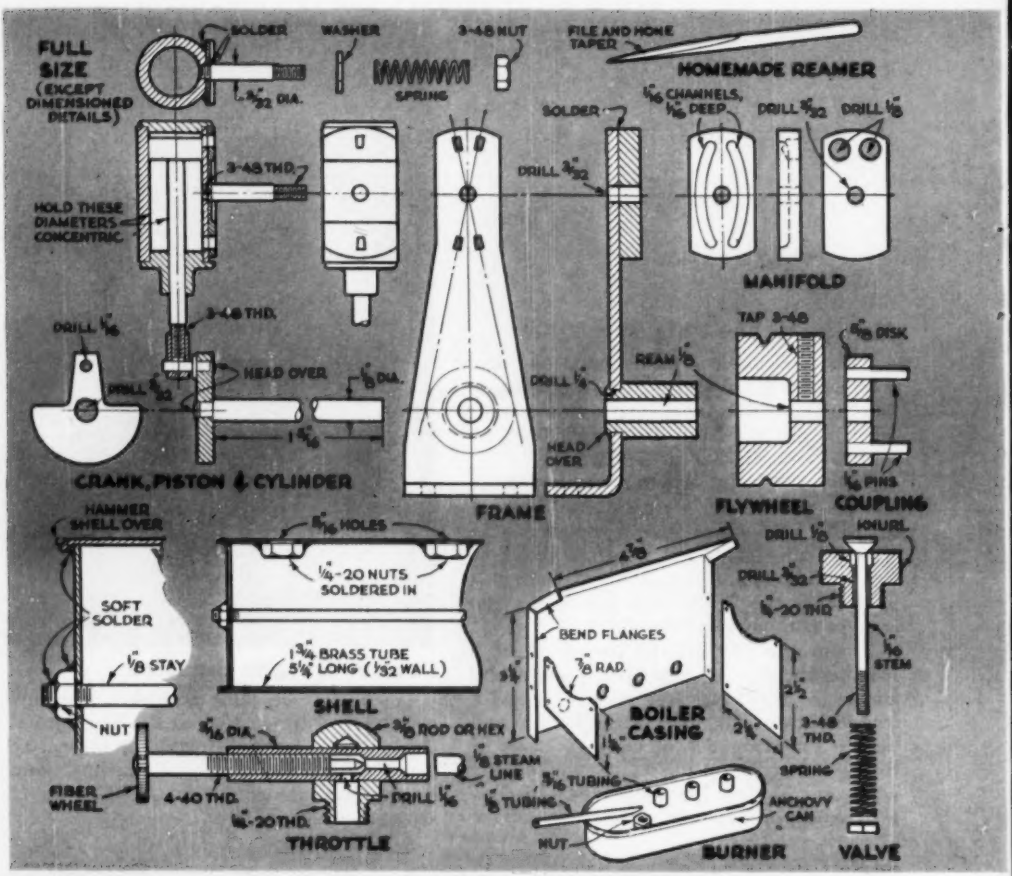




Strip Sander Makes the Job Easier and Protects the Fingers

HAVING to sand some strips only ⅛″ thick, I built this jig to save my fingers. A block is bored an easy fit for two ½″ dowels and counterbored ⅝″. The dowels are glued into a shoe rounded at both ends. Two compression springs are slipped on the dowels, which are retained in the block by washers and wood screws on the counterbored side.

Clamp the block to the saw fence or the sanding table, close enough to the sanding disk to press the strips against it. Strips to be sanded are inserted from the left or downward side of the wheel and pulled through from the back. This keeps them from riding up on the disk.—*T. K. Hastings, Los Angeles.*



Here's fun for all kids under 90. Build a perky little steam engine, hook it to a generator, and you have a

Midget Power Plant

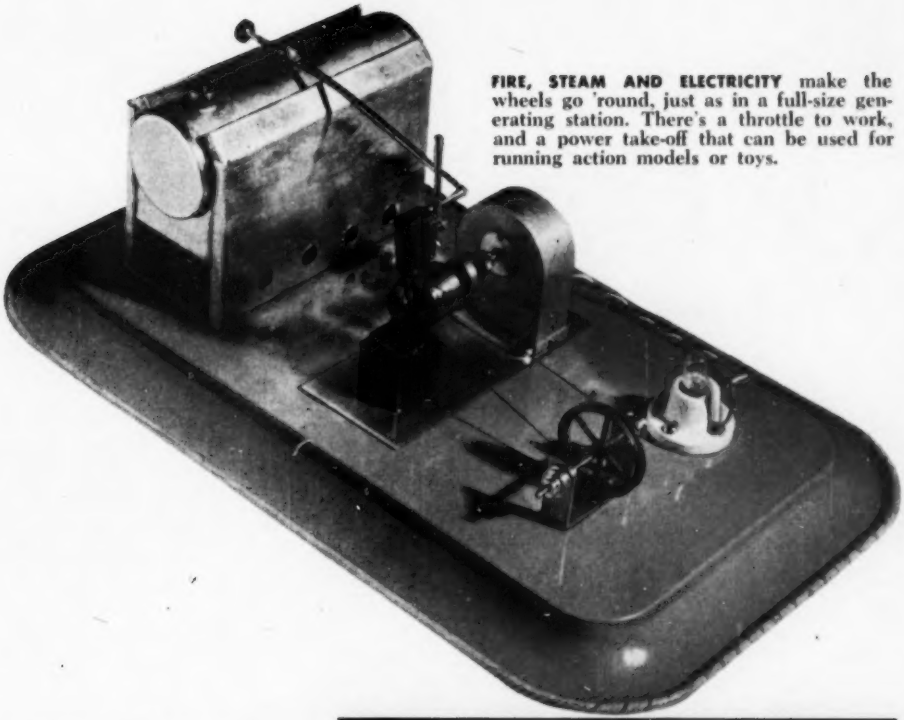
By Austin Meissner

PUT on your engineer's cap, call Junior as your assistant and get set for fun. This little generating plant makes like the real thing. There's fire under the boiler, steam hissing from the safety valve, and humming action as you crack the throttle.

That action goes to work. It spins a miniature generator. The current produced lights a small bulb. The more steam you give the engine, the brighter the light. You can also drive Erector or Tinkertoy models from a countershaft.

The double-acting oscillating engine is built up of stock brass. All turning can be done on a woodworking lathe if it has a good three-jaw chuck or drill chuck. With a bit of extra ingenuity, you might even do it on a drill press.

Frame. Lay this out from the full-sized



FIRE, STEAM AND ELECTRICITY make the wheels go 'round, just as in a full-size generating station. There's a throttle to work, and a power take-off that can be used for running action models or toys.

AT FULL THROTTLE, the generator lights the pilot bulb brightly. The 5/16"-bore, ½"-stroke, double-acting engine can go to sea in a model boat if you should happen to be marine-minded.

drawing (facing page) on 1/16" brass. Keep the long leg and port face absolutely flat when bending the foot. Carefully drill the ports and open them with needle files.

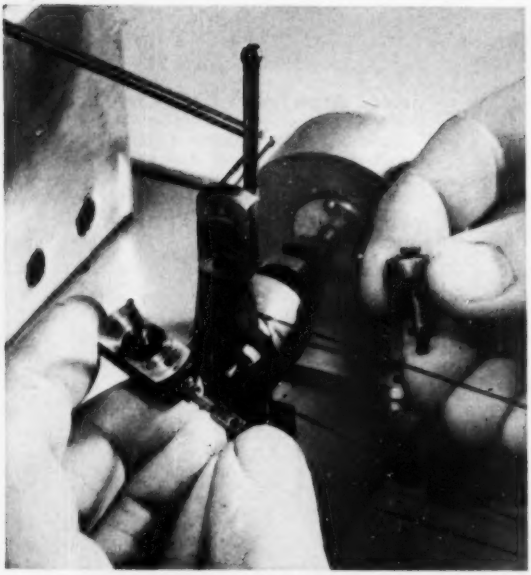
Mark out the manifold on a ⅛"-by-⅜" block. Drill the holes for steam and exhaust and cut the channels with a homemade miniature chisel or a dental burr spun in a hand grinder or drill press.

Clean the joining surfaces of frame and manifold, tin them sparingly with solder, and clamp together with a close-fitting pin or bolt through the pivot hole. Heat until solder flows freely. Lap the port face on fine abrasive paper.

Chuck a bit of 5/16" brass rod, drill or ream the ⅛" shaft hole, and at the same chucking turn the ¼" shoulder 3/32" wide. Peen this over in the frame.

Cylinder. Turn or file the ends of a piece of 5/16" (inner diameter) brass tubing squarely to length. File a ¼"-wide flat along one side. Lay out the 3/64" port plate, solder to the cylinder, and drill and tap the pivot hole through plate and cylinder wall. File a shallow recess across hole as shown.

Thread the tip of the pin only, so



THE CYLINDER OSCILLATES on its pivot pin. It is held in close contact with the port face by a spring and retaining nut. The area around the pin was recessed with an end mill, but a flat recess filed across the cylinder face will do. Safety valve (in right hand) is loaded by a spring.

that it screws in tightly without jutting into the bore. Lock it with solder, and lap with crocus cloth on a dowel.

Piston. This *must* be concentric on its rod. Chuck a bit of scrap rod ¼″ or larger, center-drill, and drill through 3/32″. Punch a mark at the No. 1 chuck jaw, remove the piece and saw through one side to the hole.

Thread or shoulder 3/32″ drill rod or stainless and mount the piston stock on it. Insert the rod in the homemade chuck with the mark at the No. 1 jaw as before. Then turn the piston to a close but not tight sliding fit in the cylinder.

Cylinder heads. Shoulder a bit of 7/16″ rod to a push fit in the cylinder and solder it into the top. Shoulder a longer piece to 3/16″ diameter; then reverse it and turn to fit the cylinder bore. At the same chucking, center-drill, run through a No. 43 drill, and ream to fit the piston rod.

A good homemade reamer is produced by filing a long taper on a piece of the same stock you used for the piston rod. Oilstone the flat face smooth. After reaming, insert the piston rod and solder the lower cylinder head in place.

Crankshaft. File crank disk from 3/32″ steel. Shoulder ⅛″ drill rod to fit the shaft hole and rivet it over. Fit the crankpin the same way.

Generator. The one shown came from a hand-powered, batteryless flashlight bought at a surplus store. A tin-can housing was fitted around it. A two-pin universal coupling connects it to the engine shaft.

Boiler. The shell is 1¾″ diameter, 1/32″ wall brass tubing. Drill holes for filler and throttle, and solder ¼″-20 nuts inside. File the shell slightly flat above them. Hold the nuts with bolts while soldering the ends in.

These are cut from 1/32″ sheet brass. If they are silver-soldered into the shell, no stay is needed. For soft soldering, set the ends in a bit as shown and hammer the shell over lightly. A threaded copper or brass stay should be run through both ends.

Fittings. Shoulder ⅜″ stock to ¼″ and thread ¼″-20. Drill the body of the safety valve oversize for the stem; then counterbore it ⅛″ at the top and face off lightly to provide a good seat. Grind the valve in with metal polish or Bon Ami.

Cross-drill the throttle body and solder in a piece of 3/16″ rod, drilled, tapped 4-40 and cross-drilled for steam admission. If your die is adjustable, open it to cut a fairly tight thread on the valve stem. Solder the ⅛″ steam and exhaust lines in place after mounting the engine and boiler on a base. An ordinary sheet-metal tray from the dime store makes a nice fireproof one.

Burner. Open an anchovy tin only enough to remove the contents; then solder it back and solder in three pieces of thin-walled tubing for the wicks and a large nut for a filler plug. Use only alcohol for fuel. Never let the boiler run dry if it is soft-soldered. END

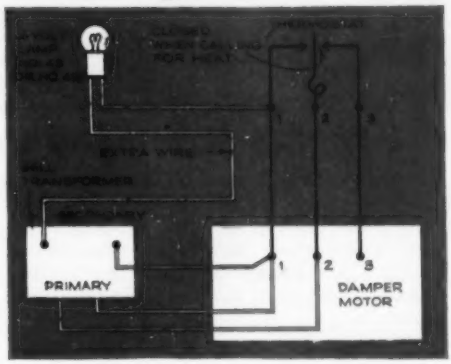
Pilot Light on Thermostat Tells When the Heat's Off

MOTORIZED draft controls save us many trips to our coal-burning furnace. But sometimes a slight dip in temperature or the chill from an open door would send us to the thermostat wondering whether the draft was on or off.

Now we have a small bulb near the thermostat, and a glance tells whether it is calling for heat—no need to twiddle the dial to find out. The hookup is safe and simple, involving only low-voltage current.

An ordinary bell transformer, a radio dial light and socket, and an extra wire are needed. This can be fished alongside the three to the thermostat, if you want to mount the transformer in the basement. If there is a cabinet, shelf or bookcase located near the thermostat, the transformer can go there and the necessary wiring will be even easier to install.

The primary (115-volt) transformer leads are connected across the contacts that open when heat is called for (1 and 2 in the drawing). There is about 20 volts across these. The transformer passes too little current to work the motor, but it steps this down to about one volt, enough to make a two-volt bulb glow. After heat is up, the contacts flip over, running the damper motor to close the draft, and the bulb goes out.



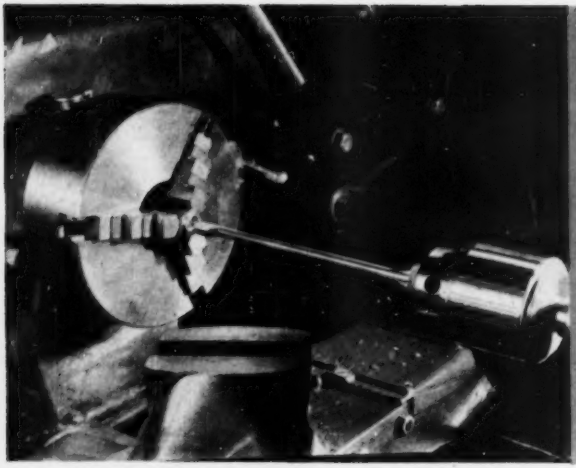
The diagram shows the transformer connected to the terminals on the damper motor. Lead No. 1 doubles as one lead to the pilot bulb. To mount the transformer upstairs, connect its primary to the proper thermostat terminals and two wires to the bulb socket, which can be mounted with a small bracket on the thermostat cover.—*Nicholas B. Cook, Paterson, N.J.*

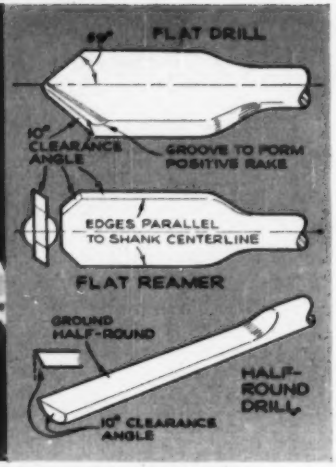
Eraser Polishes Small Work

A TYPEWRITER eraser clamped between two washers and nuts on a small bolt chucked in an electric drill makes a handy polishing wheel for small work. To use, place the drill on its side.

Chute Improves Sorting Tray

SCRAPS of lumber nailed together in a few minutes form this sorting tray. The chute drops hardware back into the receptacle after you have found what you want. —*Gilbert C. Close, Hawthorne, Calif.*





How to Make Drills and Reamers from Drill Rod

You can save yourself a big investment in reamers and special drills by making them from random lengths of drill rod. It is not necessary to buy rod for every size reamer needed; a small assortment of several diameters will fill most of your needs.

Both reamers and drills are made by heating the rod end and hammering it flat. Choose rod that is about half the diameter of the tool you're making. After hammering, heat it again to relieve the work-hardening caused by the hammer blows. Chuck it in a lathe and trim both edges of the flattened end to within a few thousandths of the finished diameter. For drills, file a 59° point on the tip and a clearance angle of about 10° on each edge of the point. If the drill is to be used on brass, no further shaping is needed. But for working steel, file a groove behind each cutting edge to give it positive rake.

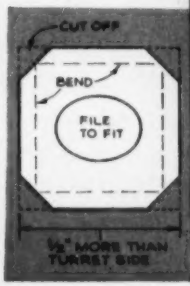
File reamers flat on the end and chamfer the corners slightly. File a 10° clearance angle on the sides and on the chamfered corners, taking care not to remove more than the few thousandths allowed on the sides.

Easiest to make are half-round drills. Grind away half the diameter of rod that is exactly the size needed and grind a 10° clearance angle on the end. They are difficult to start on a flat surface, but once started they will drill a smooth bore.

After shaping the tools, harden them by heating the tips to a cherry red and quenching in water or oil. Polish them bright and heat again until the metal takes on a straw color, then dip them at once in oil.—*Evan Wright, Topeka, Kan.*

Tin-Can Guard Will Keep Chips Out of Hollow-Head Turret Screw

Chips in hollow-head turret screws may keep the key from seating, and so make it hard to change bits. A guard cut from tin-can stock or sheet aluminum ends this annoyance. File the hole oval so that it will slide under the handle, cut off the corners, and bend the sides of the guard down over the edges of the turret.



NEW Shop Ideas

THE LAW OF GRAVITY simplifies laying out centerlines and angles on horizontal pipe with this degree jig. Charles Gonday of Dallas rigged it up at a cost of only $5. Here he uses it to mark a 17° setting.

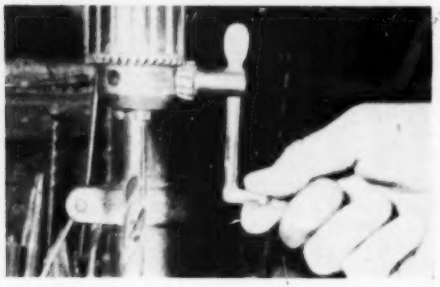
Bubble Lays Out Angles. A V block, a 10-cent protractor and a 2½" spirit bubble were parlayed into a pipe layout tool by an ingenious welder. Shown at left, the gadget speeds the marking of centerlines and angular measurements at the Temco Aircraft Corp. in Dallas.

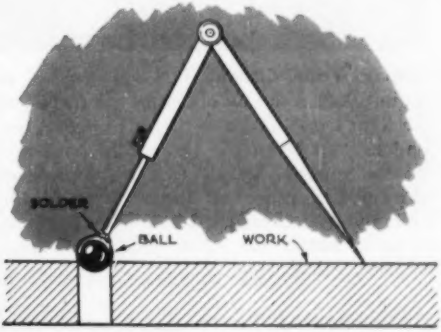
A plate is welded to one end of a 4½" V block. The protractor is mounted at the upper end of the plate. The bubble is fastened to a separate member pivoted to sweep the protractor scale and provided with an arrow. Through the apex of the V block a prick punch is aligned with the 90° mark on the protractor.

To mark a centerline, the pointer is set at 90°, the tool moved on the pipe until the bubble is centered, and a punch mark made. This is repeated on the other end of the pipe, the marks being connected with a straightedge or a chalk line. For angular settings, one mark is made in the same way. Then the pointer is reset to the desired angle and the tool moved around until the bubble is again centered.

Crank for Drill Chuck. Here is a quick way to open or close a drill chuck, especially handy to change from a big to a small drill or vice versa. I brazed a bit of round stock, the diameter of the key handle, to one end of it as shown below.

Now I crank the chuck rapidly to fit the drill, and then grasp the full handle of the key as usual to cinch it up.—*Ken Hadenfeldt, Storm Lake, Iowa.*



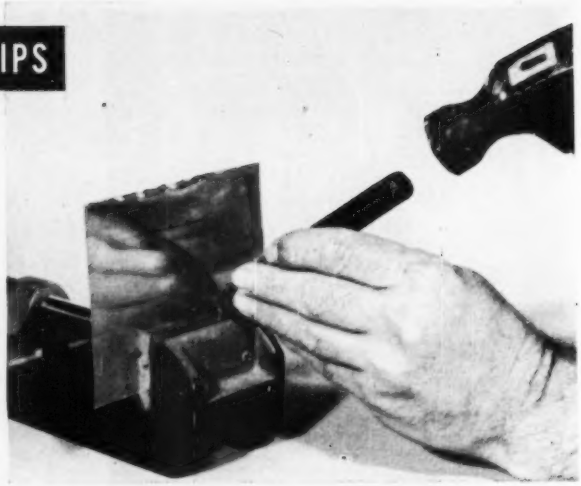


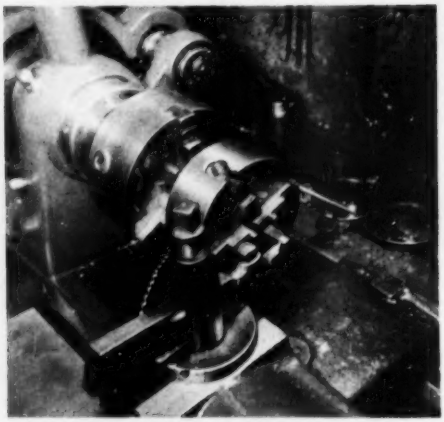
Ball Centers Compass. A ball-tipped compass leg makes it easy to lay out work from a hole. Anneal a ball bearing, drill a hole in it, and solder it to the leg. Interchangeable legs with balls of different sizes can be fitted to a draftsman's compass to fit a wide range of hole diameters.—*Federico Strasser, Santiago, Chile.*

Please turn the page for more shop ideas

MORE SHOP TIPS

Cutting Square Holes. Need a clean, straight-sided hole in sheet metal? Clamp the piece in a vise with one side of the hole flush with the jaws. Hold a sharp chisel with its bevel flat on the jaw surface, slanting it in the direction of the cut, and tap with a hammer. Reclamp to cut the other sides. If properly done, the metal is cleanly sheared without burring or deformation.—*Gilbert C. Close, Hawthorne, Calif.*

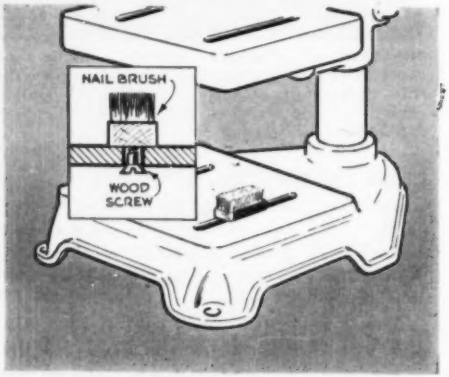


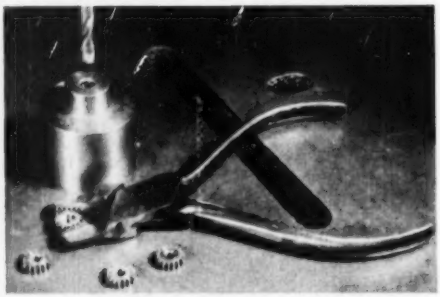


Chuck Your Chuck. It saves trouble to mount your four-jaw chuck in the three-jaw for light work. You won't have to juggle two chucks, nor clean the threads in both and on the spindle. Simply true up a piece of thick-walled pipe and thread it to fit the four-jaw as a chucking piece. The overhang doesn't matter on small jobs.—*John McGuckin, Ridgewood, N. J.*

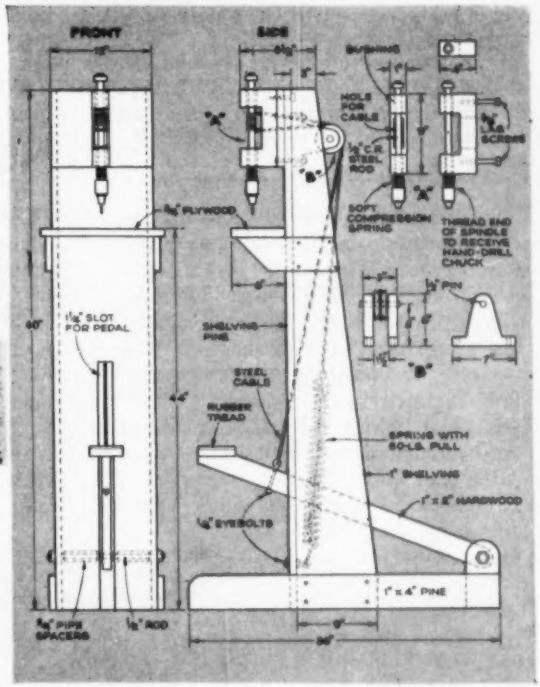
Gear-Gripping Pliers. To counterbore a lot of small pinions on the drill press, it was necessary to hold them without damaging the teeth. The jaws of a pair of pliers were ground to about the thickness of the pinions. Short pieces of rack of the same pitch were then soft-soldered to the jaws. These grip the little gears firmly and safely.—*Floyd McGuckin, Ridgewood, N. J.*

Drill-Cleaning Brush. This makes it so easy to clean drills before putting them away that you'll do it automatically. Two swipes on the brush remove clinging chips. Turn a big flathead screw into the back of a wooden nail brush far enough to make it a slide fit in one of the lower table grooves. —*Hugh Lineback, Stillwater, Okla.*





Tapping Machine Runs by Foot Power



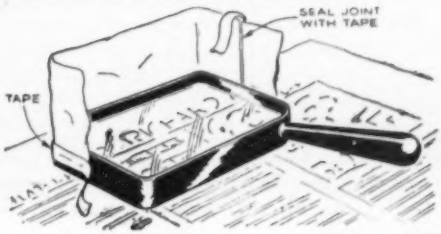
YOUR foot supplies the power to turn the spindle on this useful tapping machine. And, as the spindle turns, the tap is coaxed into the predrilled hole by a light compression spring placed between the chuck and the bottom of the spindle block.

Build the floor stand from 1″ shelving. The two sides can be cut from one 12″-by-60″ board by cutting diagonally from 3″ width at one end to 9″ at the other end.

Make the spindle block, pulley supports and pedal arm from hardwood and bolt them to the floor stand. Thread one end of a piece of ½″ steel rod for the spindle chuck, slip it into spindle bushings and screw a collar on the top end to keep it from dropping out. Thread light steel cable through a hole drilled in the spindle and wrap it about 10 times around it. Pass the lower free end through a slot cut in the stand, over one of the pulleys and down to the pedal arm, where it is fastened to a ¼″ eyebolt. Run the other end of the cable over the remaining pulley and down to a heavy tension spring having a pull of about 50 lb. Lacking the means of turning pulleys from hardwood, you can use 3″ V-belt pulleys. Grease the cable so it will roll evenly on the spindle without overlapping. The machine can also be used as a light-duty drill press. Each downward stroke on the foot pedal will make the spindle rotate about 10 revolutions and, as the pedal is raised, the spindle rotates in the opposite direction, withdrawing the tap.—*R. P. Cole, Los Angeles, Calif.*

Cardboard Shield Makes Reading Glass Easier on the Eyes

FOR the same reason that you cup your hand around a camera finder, a hood over a reading or magnifying glass boosts its effectiveness. Cutting off side glare, it eliminates reflections and makes the image clearer and more brilliant. You can easily fit a hood by fastening a cardboard strip around the frame of the glass with tape. —*John W. Nestler, Tampa, Fla.*



Gus Tricks a Truck

[Continued from page 172]

Ezra chattered, coming up. "What are we going to do, Gus?"

Gus said nothing. He swung down, scooped up a fistful of tools. He'd have to jerk the carburetor and tear it apart for cleaning.

So Little Time—So Much to Do

His mind ran over the necessary steps: throttle rod to unhook, choke wire, gas line, vacuum line, two 5/16 nuts on two studs, lift the carburetor. Disconnect linkage between throttle and accelerating pump arm, remove machine screws between throat casting and bowl casting. Pull the two apart, remove and clean jets, clear float needle and don't drop it.

Gus reached out with a pair of side cutters to pull the cotter pin off the throttle rod. A gust of wind whipped dust from Blinstock's field, and for a moment Gus was blinded.

He backed out from the hood, straightened up. The swirling dust had stirred an old memory, of a little man who had once driven into his pumps broke and discouraged, heading east to look for work. He had come from where the dust blew much worse than this, where men fled before it for their very lives. Gus had given that man a tank of gas, because he needed it, and the man had told Gus something about fighting dust.

Thoughtfully Gus moved under the hood again. Swiftly he stripped number three and four wires from the spark plugs, reversed them. He jumped into the truck cab, pumped the throttle to gain that tiny jet of injector gas, stepped on the starter. The motor roared raggedly, backfired. Gus leaped out, replaced the two wires on their proper plugs, climbed back into the cab, and the truck began to roll toward the house. Gus pulled up beside the injured man, leaped to the load of corn, kicking it around to form a bed. "Lift Steve up to me," he said. "Easy does it." They lifted the injured man, laid him gently down.

"Stay with him, Hanratty," Gus said. "You too, Shepard. Ezra, you drive. I'll ride the fender with the hood up. When I yell once, you kick her out of gear and pump the throttle fast. When I yell again, put her in gear and get going."

That was the way it was. Several times on the way into town, the truck lost power, slowed, threatened to quit. Each time, Gus yelled to Ezra as he reached in to twitch the wires from plugs three and four, and reverse them. Ezra threw the truck out of gear, pumped the throttle. The motor, freed of load, roared and backfired; Gus switched the wires back to the proper plugs and yelled to Ezra again. Ezra pulled the truck into gear, and they went on. In the hospital in town, prompt care brought Steve around and probably saved his life.

Although Ezra will always swear that it was Blinstock's dust that filled his carburetor with dirt, Gus reckoned that this had been a gradual accumulation over a period of time, caused by Ezra's foolish discarding of the air cleaner, thinking to gain power. Back in the Model Garage, Gus found Hendricks and Hanratty looking at him with admiration.

"I don't know what you did to that truck, Gus," Ezra declared, "but you did it. You're one smart feller."

"Smart?" Gus leaned against the bench and lit his pipe. "I wouldn't say that. Matter of fact, I ridiculed the idea when the fellow told me about it."

"What feller?" demanded Ezra.

"This farmer from out West," Gus said. "He told me how to clear carburetor jets in an emergency, by switching wires and causing backfiring through the jets." Gus grinned. "Sure glad I listened." END

NEXT MONTH: Gus dowses for water.

HINT TO AN UNHANDY HANDY MAN

Whatever your knack or
Your skill is or ain't;
You can paint lacquer,
You can't lacquer paint.

—Berton Braley

CHAMPION SETS GREATEST PERFORMANCE
RECORD IN SPARK PLUG HISTORY!
IN THE 1954 INDIANAPOLIS RACE,
every one of the 33 starting cars qualified and ran on Champions in the fastest "500" of all time.
QUALIFYING RECORD 141.033 MPH — 500-MILE RECORD 130.840 MPH
But more important to your motoring pleasure is this great record confirmed by the AAA Contest Board supervising the "500"—
NOT ONE CHAMPION SPARK PLUG WAS REPLACED DURING THE ENTIRE RACE!
Here is spark plug quality, performance and dependability obtainable only from famous 5-rib Champions. Better see your service station or garage and have America's favorite spark plugs put in your car. You'll be proud of your judgment!
CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO
Specify
CHAMPIONS
WITH THE PATENTED 5-RIB INSULATOR!
VUKOVICH PASSES BRYAN. In a sustained drive, Vukovich moved from 19th place starting position to 1st place and a record 130.840 MPH victory. Bryan drove a tremendous race to 2nd place at 130.178 MPH.

Think of catching literally thousands of flash pictures like this on one battery!

You can—if you use low-cost B-C Flash

We don't have to tell you the beauty of taking pictures with flash. You carry your own sunlight around with you . . . put just the right amount of light right where you want it.

However—it's been found that, when the batteries in a flasholder become weak with age, they can be slow in firing the flash bulb. Consequently, you miss the picture. *That's where the new B-C (battery-condenser) Flash comes in.*

Here's how B-C works

A small 22.5-volt photoflash battery feeds power to a condenser which *stores* the power until needed. When you trip your shutter, the condenser, fully charged between shots, fires the lamp in a single surge *many times as strong* as the force of the usual 1.5-volt flashlight batteries.

Now you can see right away that the B-C method offers you some really important advantages. First of all, of course, is the fact that you get full voltage on every flash shot. Secondly, B-C assures positive and reliable timing even when the battery begins to weaken. Thirdly, the condenser charge is so powerful that it will fire several bulbs at once (instead of having to have an additional set of dry cells for each flasholder). And when the circuit is wired in series, all the bulbs fire at the same instant—no laggards. And to top it off, B-C is thrifty. It avoids failures and misfires that waste bulbs and film. Generally speaking, a single leak-proof battery is good for thousands of shots . . . does the job of several ordinary batteries.

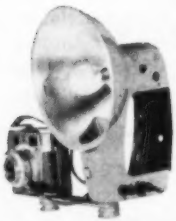
On the opposite page there's a guide on how to choose just the right B-C Flash for your needs. Your photo dealer will be glad to help you select the equipment that's best for your camera.

Advertisement

Now here's how to choose the B-C Flash that's best for you

For simple flash photography, choose the KODAK B-C FLASHOLDER

If you plan to use from one to three flash bulbs at a time, the sturdy, low-priced and popular Kodak B-C Flasholder will serve your needs very well indeed. It takes the inexpensive, readily available "midget" bulbs (SM, SF, No. 5 or 25). Its new Lumaclad reflector gives you 50% greater light output than matte-surfaced reflectors, has a handy exposure guide printed right on it. The quickly adjustable bracket fits most flash-shutter cameras, is easily removable for off-the-camera flash. Has transparent flashguard (for protection if a bulb should break) and "pop-out" type bulb ejector. A real value at $9.95*. Flasholder also provides connections for one or two Extension Units for multiple lighting. Each unit, with 20-foot cord and cushioned, adjustable clamp, $11.



If you're interested in advanced flash, you need the KODAK EKTALUX FLASHOLDER

For advanced photoflash work you'll want the Kodak Ektalux Flasholder. B-C powered, it simultaneously fires up to 6 bulbs employing up to 120 feet of extension cable. Magnesium-constructed for durability and light weight, it fits most types of cameras. Features convenient, pistol-grip handle; removable, easy-to-pack reflector; quick load-eject sockets for both midget and medium-base bulbs. Addition of solenoid permits tripping shutter from Flasholder; a Synchro-Switch permits external synchronization if needed; Remote Release Cord permits exposure control up to 20 feet from camera. Brilliantly meets the most exacting tests of flash taking. From $29.75*

If you already own a flasholder, the KODAK B-C FLASHPACK is for you

If your present flash equipment accepts two "C" type flashlight dry cells, end-to-end, you can convert it to dependable B-C flash at minimum cost. Just slip this low-cost Kodak B-C Flashpack and a 22½-volt photoflash battery into the dry-cell receptacle and you're ready to shoot! $2.95*

*Batteries not included

Prices subject to change without notice

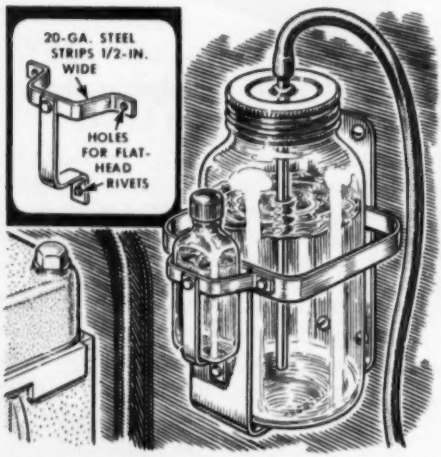
Eastman Kodak Company
Rochester 4, N. Y.

Kodak

Hints FROM THE MODEL GARAGE

Attach a cigar box to each side of a creeper headrest to hold wrenches, screwdrivers and other small repair equipment. Kept in the boxes, the tools will always be within easy reach, no matter how much you move around on the creeper.

An ordinary shower hose, with spray head attached, makes quick work of thawing out a frozen trunk lid to get at the chains and jack. With the faucet attachment slipped into the exhaust pipe, hot engine gases melt the ice without damaging paint.



Make a small metal cradle and attach it to the side of your windshield-wiper reservoir bracket to hold that little bottle of solvent antifreeze that's always getting lost or broken. The cradle is held together and to the bracket with flathead rivets.

Store tire chains on disks of heavy cardboard or wallboard cut to the outside diameter of the tires. Free from kinks and easy to handle, the chains can be brought up alongside the wheels and transferred from the disks to the tires in short order.

 Please turn to page 254 for more auto hints.

Who puts the "Genuine" in Genuine Ford Parts?

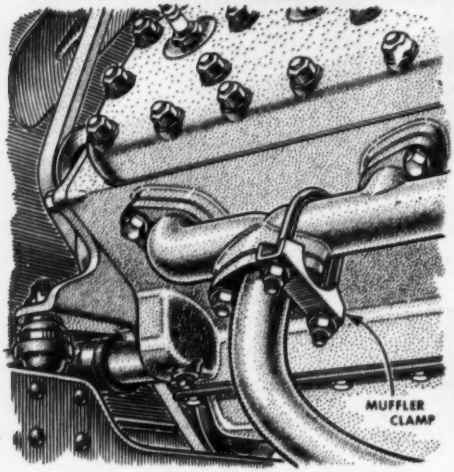
The same men who originally built your Ford set the specifications for Genuine Ford Parts. This means they're made right for your Ford, to fit right to last longer.

The way to keep your Ford running like new, even though replacement parts are called for, is to always get new parts that you *know* are made *especially* for Fords. This means *Genuine Ford Parts.* Every Genuine Ford Part is made to *exact* Ford specifications, and put through gruelling tests by Ford engineers, both in laboratories and test tracks, before they're approved for manufacture. That's why we say:

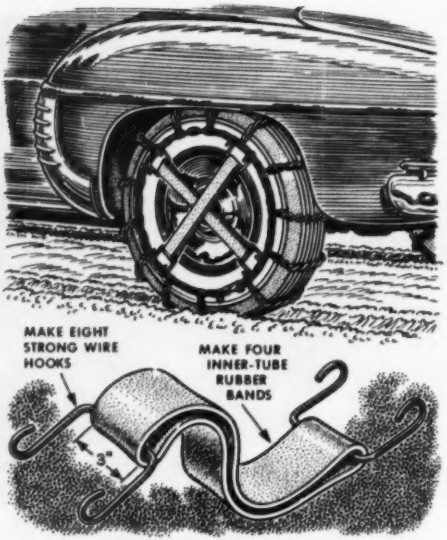
GENUINE Ford PARTS

WHEREVER YOU GO, INSIST ON

MORE Hints from the Model Garage



When a bolt connecting the exhaust pipe to the manifold is twisted off, you can often make a durable repair by placing a muffler clamp around the manifold and under the pipe flange. It's simpler than drilling out the broken bolt end.



Stop tire chain slap in 20 minutes with a set of homemade tighteners. Cut four rubber bands from an inner tube and bend eight double hooks from stiff wire. Slip two of the wire fasteners through each band and attach them to the chain links as shown.

Try this if your car heater becomes airbound. Pull the hose connected to the upper heater tube back an inch and drill a 1/16" hole through the top of the tube. Move the hose forward to cover the hole. Uncover it briefly whenever air-binding occurs.

Having trouble with an oil-passing cylinder that fouls the spark plug every few miles? To help you get home, clean the plug, replace it, and anchor the ignition cable ¼" from the plug with wire. The resulting hot spark slows soot build-up.

Ask your hands to tell you

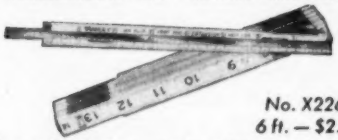
You don't have to be a carpenter to want, yes, even to need — fine tools. Put a Stanley tool in your hands. Use it. You'll feel the difference. For everyone from schoolboy to professional *Stanley is the toolbox of the world.*

Tool UP With Stanley Take this "100 PLUS", for example. Sure, you can drive a nail with almost any hammer — one way or another. But your hands will tell you *this* one. It hits the nail hard, and drives it straight and deep. You'll get a smacking sense of satisfaction every time you use it.

*Western prices slightly higher.

"100 PLUS"
*No. 11½ — $3.50**

Measure UP With Stanley



No. X226 — 6 ft. — $2.75

A good rule is a must, and a new favorite is this Stanley '100 PLUS'. It's a good friend, many times tested and all ways true. The joints lock firmly, the square ends stay square, the handy 8-inch brass slide slides but never slips, the easy-to-read numbers are always easy to read. For *more* than a measure of satisfaction, say Stanley the next time you buy a rule.

Tool UP With "YANKEE"®

No. 41 — $5.65

The "Yankee" push drill is a quick, one-hand worker . . . the ideal tool for boring screw holes. The drill point spirals in easily and the built-in spring returns the handle for the next stroke. You're through in no time. What's more, the magazine handle holds 8 drill points from 1/16 to 11/64 inch — the size is always right.

THE TOOL BOX OF THE WORLD

STANLEY Tools

ELECTRIC TOOLS • HARDWARE • STEEL STRAPPING • STEEL

How Long Is Your Square Tongue?

Sure that's a silly question. But if you haven't a steel square you'll never know.* On the other hand, with one of these Stanley rafter squares you can really get on top of things — build a roof, for instance, on your new porch or garage. Send for your free copy of "Rafter and Framing Squares". You'll learn all about roof framing, common rafters, hip and valley rafters, brace measures, etc. Use the coupon.

*The Stanley rafter square tongue is 16" long.

STANLEY TOOLS, 404 Elm Street, New Britain, Conn. or
STANLEY TOOL CO. of CANADA, 404 Stanley St., Roxton Pond, Que.

☐ Please send me STANLEY TOOL GUIDE for which I enclose 25¢.
☐ Please send me FREE "Rafter and Framing Squares" — S51.
☐ Please send me FREE "YANKEE" Tool Book Y41.

Name_____

Address_____

City_____ Zone_____ State_____

How to Pick Out a Hi-Fi System

[Continued from page 179]

"What are we listening to now?" I asked the salesman.

"A Pilotone," he said. "It costs $69.50."

"That's a right price for you," my friend said. "You *could* spend as much as $269.50. You'd be getting a better, more elaborate, more powerful amplifier, but at your stage of this game you'd mostly be buying bewilderment for yourself. This Pilotone has provisions for four recording curves."

"All right," I said. "I'm satisfied. Let's go."

The next day, the parts of the hi-fi system that I had bought arrived at my apartment. Fortunately, speaker manufacturers enclose plans for a proper enclosure with each speaker.

I took the plan that came with mine to a nearby lumberyard and had the pieces for it cut to size out of a four-by-eight-foot panel of birch-faced, lumber-core plywood. Including milling charges, the bill came to $22.78. While I was there I picked up some one-inch scrap to use for screw blocks, and a piece of hardboard to make a control panel.

Woofers and Tweeters Will Come Later

Building the speaker enclosure, called a bass-reflex and scientifically designed to bring out the best in the Diffusicone speaker, was surprisingly easy.

I mounted the record player and the amplifier in my old phonograph cabinet.

My blasé friend says that if I run true to form, in six months I will start adding woofers and tweeters to the speaker system and begin lusting for an amplifier with a control panel like a DC-7's.

Maybe so. Right now, though, I am blissfully content with the concert hall I have created in my living room. In fact, you can't drag me away. END

How to Fill Your House with Music

[Continued from page 184]

actually forms the whole front opening of the cabinet. Thus the sounds from all three speakers are blended as they emerge.

Every box-type speaker enclosure except one that is a true exponential horn must be padded. Otherwise the sound would just roll around inside and cause the enclosure to boom. Wood-fiber insulation, jute cushions or several layers of commercial absorbent cotton, held in place with loosely woven cheesecloth and stapled down, will do well for padding.

Mount Speaker in Well-Built Box

Wiring need not worry you. Loudspeaker lines are not in any way connected to house power lines. They carry only safe, low-voltage "audio signal" power. They may be easily hidden and run in out-of-the-way places. You can use common double-conductor lamp cord for them.

Please remember that many good dollars that you spend on a high-fidelity loudspeaker will go down the drain if you mount the speaker in a box of thin, weak wood, flimsily held together. Always use wood that is at least five-eighths of an inch thick and preferably seven-eighths. Plywood is acceptable.

Don't spare the glue and the glue block. The mating edges of the wood sides of an enclosure must be well-sealed with glue. The entire structure must be firmly screwed together.

A good hi-fi enclosure must be a regular wooden Rock of Gibraltar. END

NEXT MONTH . . .

How Hi-Fi Records Are Made

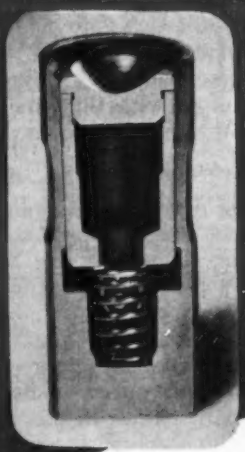
To get the best results from any hi-fi phonograph, you should play records on it that match in excellence the apparatus you have assembled for reproducing them. Today, new equipment and improved techniques are turning out better records than have ever been made before. Read the November issue of PSM to learn how the job is done.

Texaco Tips on car care

How to achieve greater parking safety

Many serious accidents occur at night as motorists get out of cars parked on the street. A good safety precaution against this danger is placing a strip of red reflector tape on your car doors (see illustration). This flashes a warning to approaching cars as soon as the door is opened.

How to get smoother engine performance



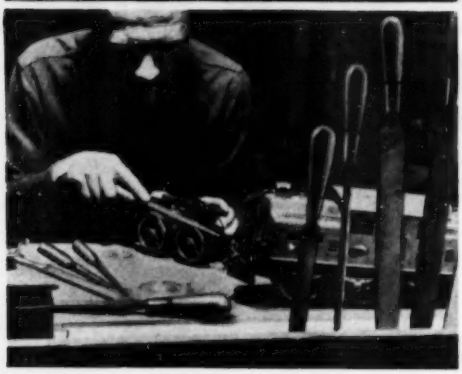
Today's high-compression engines out-distanced Nature's best motor oil. A better motor oil had to be made—and Texaco engineers did it! They developed *Advanced Custom-Made Havoline*. This great new motor oil, with its *Balanced-Additive* formula, helps keep those extremely close valve lifter clearances properly lubricated and quiet (see cutaway model at left). The new Havoline helps your engine stay clean, free from sludge, carbon and bearing-eating acids . . . actually wear-proofs your engine for the life of your car. Get *Advanced Custom-Made Havoline* today! See your Texaco Dealer . . . *the best friend your car has ever had.*

Change to *Advanced* CUSTOM-MADE HAVOLINE
. . . the best motor oil your money can buy.

THE TEXAS COMPANY
TEXACO DEALERS
in all 48 states

Texaco Products are also distributed in Canada and in Latin America

GOOD FILING
is a number of things



Good filing results are achieved mainly through the combination of—

1 good files
2 well cared for
3 properly used
4 and selected in the right type, cut and size for the job.

Nicholson can assure you the No. 1 requisite, to wit: files made under the highest standards for quality, uniform hardness, evenly-high teeth, and long-lasting sharpness. In looking for them, you have the right password when you say "NICHOLSON" or "BLACK DIAMOND" to your hardware or tool-supply dealer.

Requisites Nos. 2, 3 and 4 are up to you. But here's an excellent guide: Nicholson's famous 48-page illustrated book, "*File Filosophy*," on kinds, use and care of files. Next to a technical-school training, there's no better source of information. *FREE—WRITE FOR IT.*

NICHOLSON FILE COMPANY
19 Acorn St., Providence 1, R. I.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ont.)

NICHOLSON U.S.A.

NICHOLSON FILES *FOR EVERY PURPOSE*

How They "Paint" Color TV Pictures

[*Continued from page 104*]

and hot, his men achieve the effects he wants.

A crew of four climb high stepladders to hang the main pattern of lights on overhead pipes two or three days before a particular TV show is to be staged in color. Then the major details are blocked in to fit the requirements of the show's director. A pool of light is dropped on the floor here to bathe a dancer in pleasant warmth. At the back of the stage, decorative pillars are spotlighted to add depth. High on a balcony overlooking one side of the stage, the finer touches are rehearsed at an organ that pours forth light instead of music.

Mechanical Brain Adjusts Lights

The relative brightness of every lamp on the set is fixed in advance, scene by scene, on movable wheels in a rudimentary mechanical brain beside the organ console. The keys and stops on the organ are pushed as the play proceeds, and the lights go up and down, on and off, so precisely that you have to know where to look to see the individual changes.

Whole batteries of lights are made to perform with artful delicacy through a single rheostat on the light organ. Settings and moods are completely, though imperceptibly, shifted with this device over periods as long as half an hour.

Preparations Are Lengthy

For at least two days, and sometimes three or more, the "light painters" continue preparations. The lights on the overhanging pipes are moved fractions of an inch to enhance the action as rehearsals reveal it. "Barn doors" shading the larger lamps are tilted this way and that. New lights are introduced to eliminate shadows cast by earlier lights.

Lighting doesn't accomplish everything single-handedly, of course. Infinite care goes into the color combinations of scenery and costuming. Hours are spent on personal make-up, with special attention to complexion, the aspect of color

[*Continued on page 266*]

New Porter-Cable Homemaster 1/4" Drill

Now, just in time for Christmas, a new Porter-Cable 1/4" drill . . , plus a complete 12 piece drill accessory set . . . all for the special introductory price of only $29.95. Show this ad to your wife. Or buy one as a gift for yourself. You can't miss. New Homemaster Drill stands way out in front both in features and value: Gear chuck, trigger switch, ball bearing on spindle, polished finish, 2 amp. motor. Kit includes rough sanding and finish sanding discs, polisher-buffer, back-up pad and attachment, three twist drills, 1/4", 3/16", 1/8", polished metal carrying case, etc. See your dealer or drop postcard for name of nearest Porter-Cable Homemaster Store. **Porter-Cable Machine Co., 2470 N. Salina St., Syracuse 8, N. Y.**

Plus
12 Piece Accessory Kit
in Special
INTRODUCTORY OFFER

Special Combination Price **29.95**

Drill Alone **24.95**

12 piece kit included in introductory offer, . . . ONLY **5.00**

2 VISE-GRIPS Used by Priest in Philippines AS COMPLETE TOOL KIT FOR JEEP!

"Here in the Philippines, I have used a 7" Vise-Grip for years. Your advertising in no way exaggerates its usefulness! Now I am ordering a 10" Vise-Grip too, for my jeep. These 2 versatile wrenches will suffice as a whole tool kit—often needed on the bad jungle roads here, far from civilization and repair shops."
—Rev. J. S. (S.J.)

DOES MORE JOBS EASIER THAN ANY OTHER TOOL!

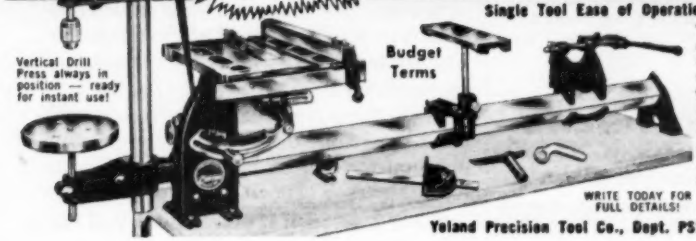
True stories like this show why Vise-Grip is the HANDIEST tool of all! A squeeze of the hand *locks* these powerful jaws onto work with *Ton-Grip*. Pulls, bends, turns, twists, ratchets, cuts — WON'T SLIP. A whole tool kit in one trim tool! At your dealer.

Made only by **PETERSEN MFG. CO., DEPT. P-10, DEWITT, NEBR.**

The New Improved PLANACENTRIC
5-in-1 HOME WORKSHOP
with 8-Inch Tilt Arbor Saw and Tilt Arbor Sander
$89.95 less motor

Save $70 and even MORE!

Single Tool Ease of Operation! No Lift! No Strain! No Bother!



The only one on the market with *all* these features *for only $89.95! 8" tilt arbor* saw and sander, vertical *and* horizontal drill presses, industrial type lathe. Planacentric Home Workshop rips, crosscuts, miters, dados, bevels, drills, countersinks, sands, planes, routs, turns wood and plastics, grinds, polishes, *does every job in the woodworker's dictionary*. Heavy construction, professional quality, steel and cast iron parts, precision performance.

WRITE TODAY FOR FULL DETAILS!

Yoland Precision Tool Co., Dept. PS104, 20 Boylston St., Boston, Mass.

MORE SANDING AREA

than any sander in its price class

LOWEST SANDER DESIGN

IDEAL CHRISTMAS GIFT
only $14.95
model 700

The Newest Power Sander and Polisher on the Market

As efficient as any rotating motor-driven sander, plus these quality features: straight-line action, no bucking, sands *with* the grain and goes all the way into corners; powerful 60 cycle reciprocating motor gives 14,400 strokes per minute; exclusive insulation gives smooth, quiet operation; push-button control; 8 foot cord.

Weller **SANDERS**
806 Packer Street
Easton, Pa.

AVAILABLE AT HARDWARE STORES

The Gas Turbine: Car of the Future?
[*Continued from page 114*]

Another passenger turbocar has been built in Czechoslovakia, and the Germans are reported to be working on one. At Pau in southern France, the Turbomeca firm has tested a turbine-powered car, and Continental Motors of Detroit, exclusive U. S. licensee, is adapting this engine to a road vehicle.

For four years the Boeing Airplane Co. of Seattle has been running a big trailer truck on the highways with full payloads, powered by a Boeing 175-hp. gas turbine which weighs only 240 pounds—at least 2,500 pounds lighter than a piston engine of the same power and using about 13 percent of the space (PSM, Feb. '52, p. 163).

"The gas turbine may well be the means for achieving the return of the low-priced automobile," says Boeing's Henry C. Hill, predicting that future turbocars may weigh 40 percent less than today's popular-make cars. "It is not unreasonable," he says, "to expect small gas-turbine engines to be built for about the same space volume, weight and price as the automatic transmissions in the latest automobiles!"

The first American turbocar, General Motors' "Firebird," a sleek, rocket-styled single-seater, was displayed in hotel ballrooms last January, but GM engineers explain that it is not the car of the future, but a laboratory on wheels from which they hope to learn how to make more and better turbocars.

Last June, General Motors brought out the world's first experimental turbine passenger bus; its engine delivers twice the power of a diesel and saves 1,500 pounds in weight. W. A. Turunen, GM's chief gas-turbine engineer, warns against over-optimism but reports that fuel economy is improving, and that the characteristic high-pitched whine has been muted by insulation.

Since the power turbine is "free-wheeling," you can't depend on engine compression for partial braking, as we do in today's cars. Turunen's answer is to pro-

[*Continued on page 268*]

The CHRISTMAS GIFT

that has everything any homecraftsman or hobbyist needs

FOR SCORES OF MONEY-SAVING JOBS

Perfect gift to give or receive . . .
useful all year 'round. Each kit includes:

- **Weller 8250A Soldering Gun—250 watts**
- **Famous Kester Solder—general purpose spool**
- **Soldering Tip—for all kinds of soldering**
- **Smoothing Tip—for mending and sealing**
- **Cutting Tip—for plastic tile, etc.**
- **Wrench—for tip interchange**
- **Instruction Booklets—handy soldering and homecraft hints**
- **Metal Case—for storage and carrying**

Nothing else to buy for soldering, sealing, cutting, mending, joining and smoothing. Makes professional results easy.

only $14.95
MODEL 8250AK

NEW WELLER GUNS AND KITS ARE AVAILABLE AT HARDWARE DEALERS

Junior
SOLDERING GUN

- **New, Compact Design**
- **Heats in 5 Seconds**
- **Over 100 Watts**
- **Trigger Switch Control**
- **Dual Spotlights**

The ideal homecrafters' soldering tool. No other soldering gun or iron offers the professional quality, practical features and low price of the Weller JUNIOR.

Weller THE FINEST TOOLS FOR THE FINEST CRAFTSMEN
ELECTRIC CORPORATION
806 Packer St., Easton, Pa.

SOLDERING GUNS • SOLDERING KITS • POWER SANDERS

Gold Bond Announces New double-action TWINSULATION

New Gold Bond Twinsulation gives you *two* heat barriers that keep summer heat *out*, furnace heat *in*. Pays for itself in fuel savings alone! And next summer your home will be up to 15° cooler.

You can apply easy-to-handle Twinsulation Blankets yourself. So, whether improving an old home or planning a new one—for extra year 'round comfort, get new double-action Gold Bond Twinsulation.

NATIONAL GYPSUM COMPANY, BUFFALO 2, N. Y.

Send coupon now for this how-to-do-it home insulation booklet.

NATIONAL GYPSUM COMPANY
Dept. PS-104, Buffalo 2, N. Y.

I enclose 25¢ for which please send me your Gold Bond Rock Wool How-To-Do-It Booklet.

Name.....

Address.....

City.....*County*.....*State*.....

Builder Designs Out Upkeep
[*Continued from page 118*]

bleized white linoleum for the ceiling and walls. To get white, he had to buy plastic-base linoleum. His floor, equally inoffensive, is of regular less costly linseed-oil linoleum. Other rooms in the house, particularly the baths, have had the same neutral or pastel treatment.

The exterior of the house is partly manufactured stone, partly wood siding. For the appearance he wanted, Natter knew he could use cypress or western cedar for siding. But he wanted a varnished finish, and neither wood, varnished, would retain its appearance under weathering. He knew that Spanish cedar, resembling mahogany, is used for the woodwork on sailing craft. Slightly softer than mahogany, it machines beautifully and won't splinter.

Varnish Brings Back Vanished Color

Natter experimented with it. Exposed to the weather, it did not darken—it bleached. But he found, to his satisfaction, that a quick brushing with varnish brought its rich, original color right back. He figures the maintenance item on his outside woodwork at about a day every couple of years.

Natter's anxiety over easy maintenance probably stems from the multiplicity of his activities. He has to budget his time. An industrial-arts teacher by day at New York's De Witt Clinton High School, he teaches modern ballroom dancing and radio and TV repair in the evening. He picks up still other income by servicing sound systems. All of his extra money goes into the house, on which he conscientiously works weekends and from four to seven p.m. daily.

Besides bounce and enthusiasm, Natter is crawling with talent. He is licensed to teach 27 different subjects, ranging from auto mechanics to welding. He can make almost anything out of an old vacuum-cleaner motor. He dotes on the things. Among other homemade tools he has powered with them are an oscillating sander, lathe tool-post grind-

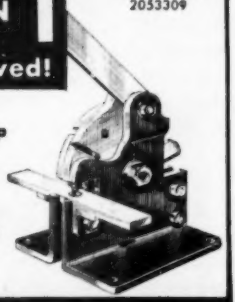
[*Continued on page 264*]

BACK AGAIN!

4 TOOLS IN 1

Bigger! Improved!

Patent No. 2053309



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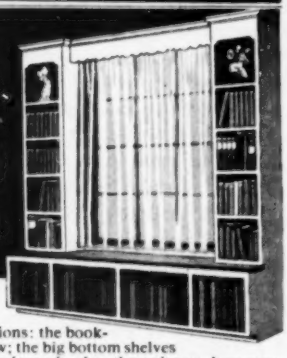

This distinctive piece serves 3 desirable functions: the bookcase frames the window; the big bottom shelves hold record albums or large books; the valance decorates the window top. *You build without blueprints!* Our simplified Easi-Bild* Pattern #271 shows how to cut each piece to exact size—how to assemble the bookcase—specifies all materials. *You save up to two-thirds of the usual cost!*

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Now is the time to fix your worn-out screens for keeps. Replace with screening woven from genuine Alcoa® Alclad Aluminum Wire and relax. It *won't* stain your sills and siding. It *will* last for years.

Hardware stores and building supply yards carry Alcoa Aluminum screening. Look for the Alcoa label. Write for folder that tells easy ways to replace screening.

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Service station owner William Savage, Detroit, Mich., says: *"if your oil filter's clogged like this, install a Purolator Refill—fast!"*

"Look, the book that came with your car* says—

Change your Oil Filter every 5,000 miles"

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If you've driven 5,000 miles since changing your oil filter, it's probably clogged. Install a new Purolator Micronic Refill—right away! Costs as little as $1.60. *More car makers specify Purolator than any other oil filter.*

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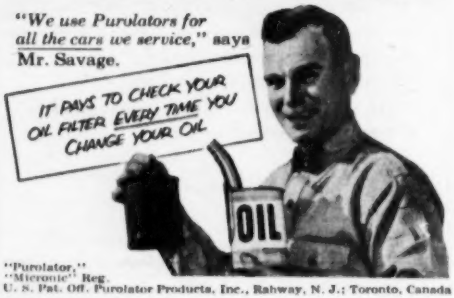
World's finest **OIL FILTER**

"We use Purolators for all the cars we service," says Mr. Savage.



"Purolator," "Micronic" Reg. U. S. Pat. Off. Purolator Products, Inc., Rahway, N. J.; Toronto, Canada

Builder Designs Out Upkeep

[*Continued from page 262*]

er, jointer-knife sharpener, a die-engraving machine and a portable grinder. He has sketched out an idea for raising and lowering the pillow end of his bed by electric motor so he can elevate his head to read by pushing a button.

Plumbing Was No Pipe

By a bit of judicious water-pipe design, Natter directed the flow from a bathroom mixing valve so that one of two spigots would pour water into the tub or shower head. That eliminated two of the valves customarily used.

His economies have been heroic. By digging his own ditch for his plumbing pipes he saved $400; by making his own double-glazed windows, $1,100. An accomplished cabinetmaker as well as carpenter, he made one solid-mahogany storm door in his home workshop—again, from lumber he milled himself—for a total cost of seven dollars. The sides of all the drawers in the house were cut from leftover short lengths of siding. The guides were made from leftovers when he laid some of his oak flooring.

When he puts up his wall paneling, it will be with a diathermic gluing machine that he built at a cost of $300 and that will save him $700 in rental fees.

A good-sized house built in one man's spare time takes a long time to put up. Natter has been at it now for four years. He figures he has about a year to go. He moved into it in the summer of 1953.

At 33 he is still unmarried. Always of a precise turn of mind, he decided long ago to get married when he was 27. World War II put him six years behind schedule. But he figures that next year will be the year—when the house is finished.

Until then, he doesn't want a woman nosing around and changing things. END

Food for Thought

Scientists at Harwell have officially denied rumors that potatoes in a cyclotron will produce fission chips.—*de Havilland Gazette.*

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WATERPROOF

For home craftsmen who want the best, a resorcin resin is the only cold-setting glue that meets U.S. government specifications for marine laminating. Defies cold or boiling water, mould, fungus, solvents, mild acids and alkalis, extreme heat or cold and continuous outdoor exposure. Use for boats, toys, outdoor furniture – wherever strongest possible waterproof bond is desired. Write for folder.

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UTICA® pliers and adjustable wrenches are good tools, skillfully forged for rugged strength. And UTICA extra-hardens jaw surfaces and cutters for longer wear.

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EVERY "DO-IT-YOURSELFER" NEEDS THIS *FREE* BOOK!

Brand new pocketsize handbook explains sanding technique on wood, metal, glass, plastic; shows correct methods and names proper tools for removing surfaces of different types of woodwork. Book lists sandpaper, grades and uses; tells how to sand hard-to-reach places, etc. Helps you save time, money on home projects—invaluable to beginners, experts. Lavishly illustrated. Send Coupon for your FREE copy now.

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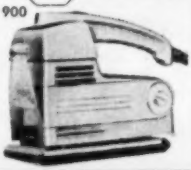
QUALITY SANDERS

No. 900



NEW HEAVY-DUTY SYNCRO SANDER HAS BUILT-IN "SIGHT-SAVING" LAMP

Husky new "900" removes paint, varnish—outlasted all other portables by running over 1,500 hours without breakdown in exhaustive laboratory tests. Easiest to use. **Most powerful** reciprocating sander **motor** (patented). Priced LOW. Rush coupon for details!

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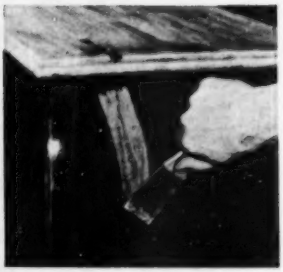
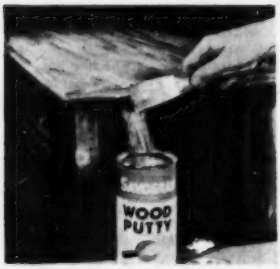
Hints on How to Refinish Furniture



Step 1. *Remove old finish*—quickly, easily, with fast-acting Strypeeze. Brush on, let it set . . . off comes the old finish. (hint: sprinkle sawdust over Strypeeze. "Roll off" sawdust, Strypeeze and old finish.)



Step 2. *Fill all holes, nicks* — permanently and simply with Savogran Wood Putty. Tools easily, won't shrink. Now, sand entire surface with 6/0 sandpaper. (For cracks in plaster, use Savogran Crack Filler. It's the original patented quick-hardening water putty.)

Step 3. *Refinish*—before you start, be sure brush is clean. Savogran Kwikeeze really cleans varnish brushes. Leaves no specks of old varnish, dirt in brush to mar finish. Apply stain, thinned shellac seal, then spar varnish or dull "rubbed effect" varnish in finishing.

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Write for FREE helpful literature

SAVOGRAN CO., Dept. 56, 25 Huntington Ave., Boston 16, Mass.

How They "Paint" Color TV Pictures

[*Continued from page 258*]

TV that even the most inexpert of viewers can judge at a glance.

Often, after the colors are chosen, it is necessary to tone light down, to take "hot spots" off bright clothing, earrings, necklaces, and the shiny metal of orchestral instruments. The tone-down process is one of the world's few workable panaceas: a plastic spray.

But the problems that light creates are far fewer than those it solves. Altogether, 60 percent of the work of color-TV staging is done with light alone.

Lights Set Moods

Here, for instance, is a script that calls for a jazzy musical mood. Is that effect left to the musicians to accomplish? Not at all. The background lights establish the jazz theme long before the band strikes up. How? With strident yellows.

When there is waltz mood, the lights are pale, dream-cool blue.

If a backdrop, as the scene designer painted it, jars the slightest bit with a costume that will focus the drama, there's no need to hurry it back to the paint shop. Colored lights will bring the hue around to a perfect complement.

Suppose the leading lady's dress is pretty, but doesn't hold the eye? A light will bring out the color without putting too much bloom in the star's nose.

"Like a painter who is doing a portrait or a landscape," Rod Davis points out, "we make our finishing touches right up to the last minute."

That's when the painters of light perform their magic before your unwitting eyes, stealing about the stage while the TV show proceeds, daubing here and there with mellow glow. END

Understatement

"Gosh," said the road hog, as he slowed down for the first time in 40 miles, and looked at the wonderful view. "Don't you feel glad you're alive?"

"Glad isn't the word," said his girl friend. "I'm amazed!"—*Pure Oil News.*

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This oil-pumper needs Tough-but-oh-so-gentle piston rings*

Wasted motor oil is one of the most expensive things you buy. Just to keep the oil-level up, soon runs into a lot of money—even worse, it soon runs into a big repair bill, too.

Every extra quart you buy is a danger signal, a symptom of worn-out piston rings. One sure way to check this wear is to install Hastings Rings—the rings that are designed for replacement service.

As your engine gets older, it runs hotter because of accumulations in the cooling system. The cylinders wear tapered and out-of-round—need more oil on the walls.

It requires a special type of rings—*replacement* rings to deliver extra oil, under full control, without waste.

Hastings pioneered in the development of steel oil-control rings and set new high standards in replacement ring service. Hastings makes replacement rings exclusively, devotes all its research to the particular replacement problems of each make and type of engine.

That's why Hastings Rings *stop* oil-pumping, *check* cylinder wear, *restore* engine performance—in re-ring, re-bore and re-sleeve installations.

So go to your motor specialist at the first sign of oil-pumping or performance drop-off. If rings are the trouble, ask him to install a Hastings Steel-Vent replacement set. Truly the best money you can spend on your car!

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TOUGH on Oil-Pumping
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New LUFKIN Micrometers have 18% Bigger Barrels

1 Choice of Friction Thimble or Ratchet Cap. Friction Thimble (illustrated below) has mechanism built right into the Thimble that automatically stops further pressure on the measuring faces when correct reading is obtained. The easy-to-reach Ratchet Cap (illustrated above) permits you to take repeated "one-hand" measurements with exactly the same pressure on measuring faces.

2 Widely spaced markings on bigger barrel are easier to read and show up better on non-glare Satin-Chrome finish . . . wider spacings also make it easier to estimate tenths of thousandths.

3 Choice of new Slip-Proof Black Crackle finish or Satin-Chrome finish on frame. Black Crackle frame makes the micrometer easiest to handle when hands are oily . . . note that new tapered frame and extended anvil permit measurements in places inaccessible to other micrometers.

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318 NAME_____

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CITY_____ STATE_____

The Gas Turbine: Car of the Future?

[Continued from page 260]

vide power-braking on downgrades by reversing the turbine. If your battery goes dead in a turbocar, you can't get started with a push, but small, one-shot combustible cartridges can be carried to start the fire in emergencies.

George Huebner Jr., Chrysler Corporation's brilliant young engineer, has stolen a march on the entire field, for his turbine-powered Plymouth contains a device which engineers knew about but thought was next to impossible to build in passenger-car size. This device is called a "heat-exchanger" or "regenerator," and at one stroke it wipes out two major barriers in the path of the turbocar. It enables the car to get about the same gasoline mileage as the piston car, and at the same time cools down the exhaust so that it won't roast people behind it.

The exact design is secret, but the basic principle of this device can be simply explained. The more combustion heat you turn into power and the less you throw away, the more efficient your engine is and the more miles you get per gallon of fuel. Most turbocars burn up the road, throwing away at least half their power. So Huebner has found a way of capturing the hot gases, after they have done the work of spinning the power turbine, and piping them back to heat the incoming fresh air. By making the gases do double duty, he saves fuel and cools down the exhaust at the same time. You can put your hand behind the exhaust and it seems no hotter than that of a piston-engined car. Chrysler reports that it is actually cooler.

Huebner believes that all purely technical problems in the way of a turbocar can be licked, but, like other experts, insists that there is no sense trying to nurse your family car along until the revolution. At present the turbine wheel, about seven inches in diameter, costs as much as a whole piston engine. Since it spins as fast as 35,000 to 40,000 times a minute, driven by gas as hot as 1,500° F.,

[Continued on page 270]

Now cut fuel costs up to 24% this easy, economical do-it-yourself way

Make your home snug and draft free . . . save up to 24% on fuel with Adjusto-Seal Weather Strip. Install this certified woven pile strip in only a few minutes per door or window.

It's the only weather strip that automatically adjusts to uneven surfaces. The pile tufts are lock-bonded in tough, durable vinyl plastic. Positively seal uneven crevices. Lasts for years. Will not dry, crack or set. Keeps windows easy-operating. Color blends with decor. Simple to install. Tacks furnished. One roll does one door or window.

Doorbottoms, too

Keep out cold, dirt, dust, insects. Adjusto-Seal Doorbottoms are woven pile in heavy gauge, pre-pierced metal. Pile reaches down deep to cover worn places—flexes to cover highs. Snips to size with shears or scissors.

Get Adjusto-Seal products at your dealers'. Use the money you save on fuel for your pet do-it-yourself project next spring.

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SUPREME PRODUCTS, INC., 2222 S. CALUMET, CHICAGO 16

Panel your fireplace wall in mahogany for Christmas for only $74*

...and it's guaranteed for the life of your home!

Give the whole family a wonderful present *before* Christmas. You can install beautiful mahogany paneling like this over a single weekend!

Easy-to-apply Plankweld paneling uses special metal clips to hold panels in place *without* nailing through the panel itself. And each 16¼" wide x 8' high panel is carefully pre-finished by expert craftsmen who know and love fine wood. There's no staining or waxing to do—put panels up and the job's done!

PUT PLANKWELD right over present wall or directly to studs. No furring needed; metal clips hold panels in place. Edge-grooved panels overlap to hide clips. Can also be installed in flush effect with new Weldwood Contact Cement.

Plankweld cleans easily with a cloth and *is guaranteed for the life of your home.*

See the complete assortment of Weldwood paneling, including superior Douglas Fir Weldwood, at your lumber dealer's. Or visit any of the 73 United States Plywood or U.S.-Mengel Plywoods showrooms in principal cities.

*App. price for 8' x 12' wall. Plankweld is available in other fine hardwoods.

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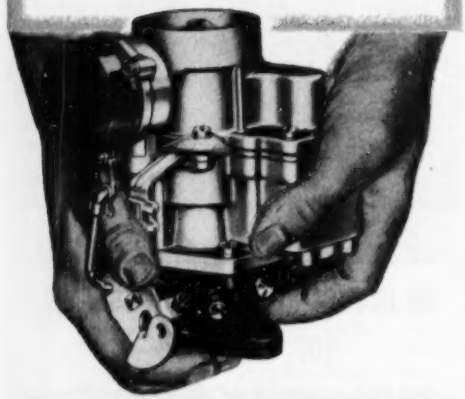

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The Gas Turbine: Car of the Future?
[*Continued from page 268*]

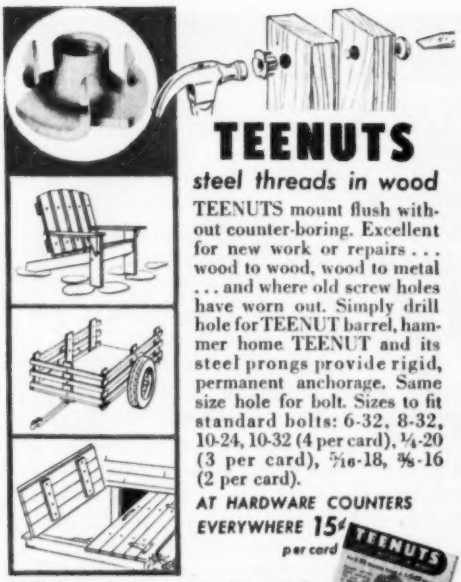
it must be made of an alloy containing such expensive metals as nickel, cobalt, molybdenum, chromium and tungsten.

Like jet planes and atomic power, the turbocar depends upon metallurgy. Dr. Andrew A. Kucher, who directs gas-turbine research for the Ford Co., is excited by new discoveries which may lead to cheap, heat-resistant alloys containing materials as common as sand. A nearer goal may be a highly heat-resistant combination of metal and ceramics, on which many firms are working. Dr. Kucher outlines theoretical conditions which would make possible a turbine power plant no bigger than a small wastebasket.

"I can't conceive of this development not moving ahead," Dr. Kucher says. "Very seldom has man devoted himself so sincerely to a project of this sort without reaping the harvest."

Five years ago, if you asked these men when the turbine-powered car would go on the market, they threw up their hands in horror. Now they merely throw up their hands. Then they go back to work. END

— *De Havilland Gazette*



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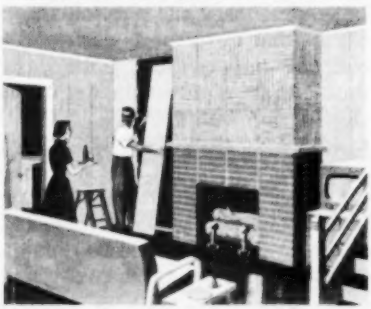

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Put them on the wall—that's all! Planks (16" x 8') and Blocks (16" square) go up fast over old or new walls with ordinary carpenter tools. No adhesive needed. An exclusive tongue and groove joint conceals all fastening. The soilproof baked Marlite finish never needs painting; cleans with a damp cloth. Ten beautiful "Companion Colors" styled by Raymond Loewy Associates, plus 4 distinctive wood patterns, are economical and practical for every room!

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PREFINISHED
WALL and CEILING PANELING

Flow on wall paint in an even coat...

Pointers on painting interior walls: wash old paint with detergent, wipe clean, let it dry thoroughly. Paint with sweeping, fanning strokes (a 4-inch brush is the most popular size). Paint in narrow strips from ceiling to baseboard. Work back towards wet areas to avoid lap marks. And always . . .

Use brushes with bristles of Du Pont TYNEX nylon

TRADE MARK

You'll do faster, better-looking work inside or outside your home when you use brushes with "Tynex" bristles.

See how Du Pont "Tynex" nylon bristles flow on a smooth coat of any type paint . . . spread it evenly over the surface. "Tynex" nylon bristles can be easily cleaned in any commercial cleaner . . . and last up to five times longer than other types of bristles.

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"TYNEX" is the trade-mark for genuine Du Pont nylon bristles

Look for TYNEX nylon bristles when you buy brushes

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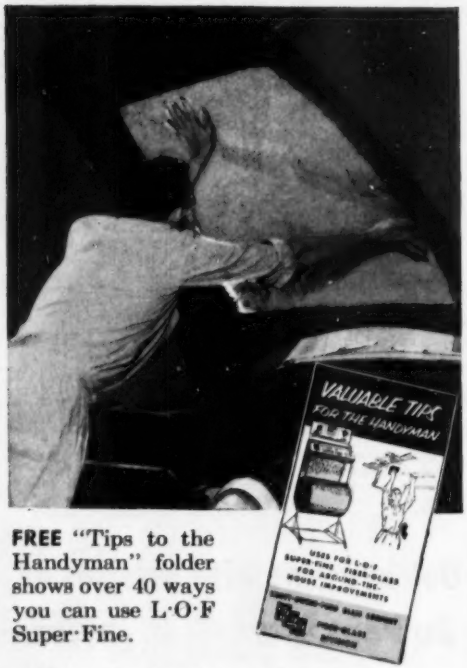
Better Things for Better Living . . . through Chemistry

HOW TO QUIET YOUR CAR

—and do "1001" jobs around the house



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Ford's New Sports Car

[*Continued from page 134*]

springs to govern "wind-up"—prevent the spring from being bowed upward—during fast acceleration. Front suspension is Ford's beloved ball-joint system.

The brakes are duo-servo hydraulics with a fat 191 square inches of lining area. Because of the 102-inch wheelbase, the frame couldn't be borrowed but had to be designed from scratch. It is a husky double-drop job with an I-beam cross-piece and four cross members.

Cozy comforts. Among the numerous fancy touches, not all standard equipment, are sensuous vinyl upholstery combinations, push-button doors, a detachable and insulated plastic hard-top, sound and heat insulation, armrests, heater and radio (what, no hi-fi?), and a sweep second hand on the clock. You can have your Bird in jet black, torch red, or turquoise.

Will it catch on? Certain developments can be predicted:

- There will be turmoils and agitations about what the Bird *is*. Ford will not succeed in its efforts to have it dubbed a "personal car"; the public will serenely call it "that Ford sports car"; and a little core of imported-car enthusiasts will stay awake nights thinking up supercilious comments.
- Although there will be virtual unanimity that the Bird isn't a competition car, single-minded owners will strip off several hundred pounds of comfort and do all right. More won't try this but will engage in casual highway scraps with such cocks-of-the-walk as Caddy, Lincoln, Corvette, Austin-Healey 100 and XK 120 Jag. The Bird should be able to take them.
- Uncounted thousands of small boys will drool over the dream of a Bird in the hand. Count me among them. END

Now It's a Boast

We can recall the time, before the craze for split-level houses began, when a fellow kept it to himself if he lived over a garage.—*Wall Street Journal.*

ONLY $36.50 Less motor

Favorite of home owners and craftsmen for 20 years! SPEEDY SPRAYER gives your work that professional paint finish everyone admires. Sprays paint, enamel, varnish, lacquer, etc. . . . 4 to 7 times faster than hand brushing! Lightweight, portable, uses any ¼ H.P. motor. Improved diaphragm principle assures clean, oil-free air. You'll find dozens of time and money saving uses for SPEEDY SPRAYER, including spraying insecticides 2-4-D and DDT. Complete outfit, without motor, only $36.50

At leading hardware, lumber, and auto supply dealers.
FREE—*write for handy booklet "How to Spray."*

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IN THE GARAGE

Keep an extra can in the garage for oiling car doors, generator, distributor, etc. Highly penetrating 3-IN-ONE makes things run better—last longer.

"3-IN-ONE" OIL

$40 A DAY BUSINESS IN YOUR SPARE TIME

ANDY PHILLIPS SAYS:
"My Belsaw Sharp Smith gives me big profits at low expense — I can run 35 to 40 Circular Saws in an 8-hour day — that makes me $40 cash."

"I also get BIG EXTRA PROFITS . . . up to $4 an hour . . . by grinding planer and jointer knives—there's always a demand for this kind of work."

You can start this REPEAT CASH business in your own home or garage while you are working at your regular job. Easy to operate, no experience needed. "My BELSAW paid for itself the first month."—H. J. Opie

For as little as $15 down payment, you can get your BELSAW SHARP SMITH rushed to you.

FREE book tells how →

YOU can start making money the very day your BELSAW SHARP SMITH arrives. Hundreds of jobs in your own neighborhood. Send for Free book "Life-Time Security."

LIFE-TIME SECURITY YOUR OWN BUSINESS

BELSAW MACHINERY CO
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"Husky Boy" arc welder air-cooled engine drive

Welds Anywhere!
In or out of the shop, the "Husky Boy" can earn bigger profits for you. And you save more on the purchase cost. Lighter weight makes it ideal for using on small service truck for quick emergency calls. For use in the shop, wheels and handles are available at a slight additional cost.

Check these **Low investment HOBART** welders too!

Full 200 amps. (not skimped)
Specially built for smaller shops requiring lighter weight and lower investment, the "Bantam Champ" gives full 200 amp.

200 Ampere Bantam Champ

You can "Build Your Own"
You can save even more by "Building Your Own" with this Hobart generator. Just connect the "Build-Your-Own" to your own used auto engine . . . it's perfect for small operations which do not justify a complete, factory built outfit.

AC Welder with AC Power for tools
The AC-AC Welder and Power Unit lets you do numerous repair jobs where no power is available . . . also furnishes emergency power for electric lights and power tools. 200 or 300 amp. size plus 5KW AC power.

Generator for "Building Your Own"

Welding Lessons $1.00 Complete operator's training course. 200 pages fully illustrated.

AC Transformer type
For improved AC welding performance. Operates on single phase 220 power lines.

HOBART WELDING SCHOOL
Be your own boss! Learn profitable arc welding at the non-profit Hobart Trade School. Skilled instructors give you on-the-job training. Complete or partial courses with latest equipment. G. I. bill approved. Write for free booklet.

Transformer Type AC Welder

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Vest Pocket Guide FREE!

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Please send additional data on items checked:
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SOLID-CENTER AUGER BITS

Here's the auger bit that makes good workmanship come easy! Smooth, *accurate* holes are bored swiftly because solid-center design gives extra strength and provides fast, positive chip clearance. Every GREENLEE 22 Solid-Center Auger Bit has accurately sized, perfect cutting edges that last through long use. "Induction Heat Treated" for uniformity, long life . . . "Plastic Sealed" to reach you factory-sharp. Available in 18 sizes: from 4/16" diameter through 24/16". Buy singly or in sets attractively packaged in handy plastic rolls, steel boxes or metal holding panels. Stocked by leading hardware and building supply dealers.

SPECIAL OFFER — GREENLEE WOODWORKING CALCULATOR—ONLY 25c

Converts linear to board feet, gives nail specifications, tool sharpening tips. Compares woods, gives bit sizes for screws, concrete mixes, painting information, etc. Convenient . . . simple to read. 3" diameter circular shape . . . heavily varnished cardboard. Send 25c (no stamps please).

TOOLS FOR CRAFTSMEN
GREENLEE

GREENLEE TOOL CO.
2130 Columbia Ave., Rockford, Ill.

Puddleproof Pavements

[*Continued from page 145*]

of the inner slopes. At no point has an adjoining bank or hillside been permitted to drain onto the road, as too frequently happens on older highways.

In order to make sure that the runoff from the Thruway will not be slowed, as well as to keep the road looking as trim as possible, maintenance crews in winter will toss every snowfall into the outside ditches. None will be shoveled onto the mall, which must be kept free to carry off melting snow on its own surface and thus lessen the chances of road icing.

Beginning next spring, mowers will start trimming the grass on the mall and the outer slopes to a maximum length of two inches. During the growing season this will be a constant job, for the men have 20,000 acres of grass to mow.

Drain at Yonkers Is Remarkable

Efficient as the Thruway's drainage system is, it is not spectacular except in one locality. That is at a point where the superhighway approaches New York City, a section of road to be finished next year. At this spot, in the suburban city of Yonkers, the engineers have placed "the million-dollar drain."

This extraordinary drain (page 142) is capable of whisking away the runoff from approximately two hilly miles of Thruway at the rate of 550 cubic feet of water per second and dumping it in a river a little more than a mile away. The drain includes a built-in waterfall, encased in a ventilation-and-access chamber over 90 feet deep. The chamber's turret rises above ground only about half the height of an average man. It looks rather like a pillbox snitched from the old Maginot Line.—*Wesley S. Griswold.*

Ahead of Her Time

Nature is wonderful. A million years ago she didn't know we were going to wear glasses, yet look at the way she placed our ears.—*Armstrong Saw Engineer.*

Amazing New Tool! It's Complete!

for the first time a **modern power tool** as simple to run as a **modern appliance**

Just Plug It In!

SHOPMASTER'S 8" TILTING ARBOR CIRCLE SAW

No Motor To Buy!
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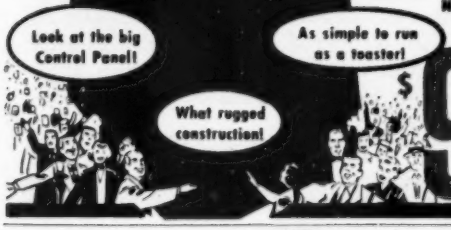
No Table To Build!

with BUILT-IN MOTOR and TABLE EXTENSIONS

Features special motor that develops up to ¾ horse power torque. Has new master view indicator, finger tip control. Blade cuts 2½" depth and tilts to a full 45°. Table size with extensions is 16"x30". Comes complete with stand, saw, table extension, built-in motor, cord, mitre gauge, stop rods, rip fence, 8" Roc-edge saw blade, plastic guard. All for only $99.50.



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Please send me complete information about the New Shopmaster Circle Saw.
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Address_____
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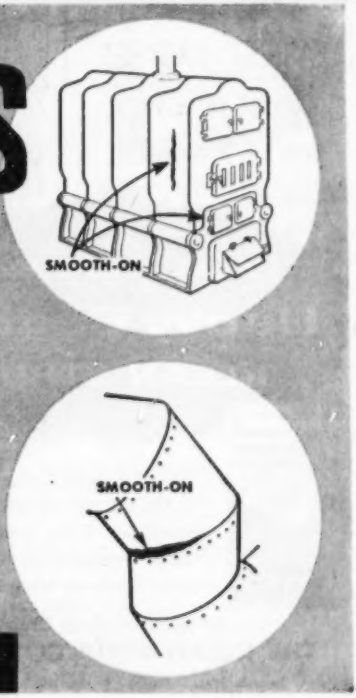
It's easy with Smooth-On No. 1, the IRON Repair Cement. Smooth-On expands as it hardens, fills cracks and holes to stay put. Withstands heat, steam, water, gases, and smoke. Stops up those unnecessary openings in conversion jobs and saves fuel.



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No brush to slow you down . . . no greasy cream to clog your razor. Just push valve . . . out comes lather! That's AERO SHAVE . . . the wonderful new "canned lather" that contains 3 beard-softeners to wilt toughest whiskers in a jiffy . . . *plus soothing lanolin to protect your skin against shaving irritation.*

Get AERO SHAVE Lather Bomb today . . . in the handy metal container with the turret top that won't leak when you travel.

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PSM Readers Tee Off on Expert

[*Continued from page 147*]

ican automobile is expensive, lacks harmony between man and mechanism and occupies too much space. There is some truth to all that, but it is about like comparing the merits of a one-legged milk stool to those of an easy chair.

The stool is cheaper, easier to maneuver, nearly nil in upkeep and occupies the least space. As for harmony between men and mechanism, nothing is more responsive than a one-legged milk stool to the delicate sense of balance of the sitter.

The few merits of the milk stool pale into insignificance compared to the comfort of an easy chair. And the merits of those cramped, rough-riding, four-wheeled motorcycles pale into insignificance compared to the superb motoring comfort offered by the American automobile under all kinds of motoring conditions.

O. L. STEENSLAND, Sioux Falls, S. Dak.

200-Percent Right

I PUSH the radio control on the dash of my 1954 chrome-plated two-hundred-odd horsepower metal monstrosity, and the eight-foot door of my undersized garage opens automatically.

Placing the automatic transmission lever in ultra-ultra drive sends this almost two tons of Detroit engineering and madness tearing over a tar-covered cowpath, designed for Model T days, and two blocks from my home to my place of business.

After touching the toe of my well-worn shoe to the power brakes and releasing the hold on the power steering wheel, I close the tinted windows on the contraption by touching one tiny button.

Alighting from my dream car I stand back to admire my nearly four-thousand-dollar investment and wonder why the heck a man weighing one-hundred-fifty pounds pays that kind of price per pound to carry his weight around.

Yes, Mr. Pomeroy, I agree with you two-hundred hp., I mean percent.

ROBERT D. GAPPINGER, LaGrange, Ind.

save

UP TO 20% ON FUEL!

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CHAMFER CHAIN
for all chain saws

ATKINS SAW DIVISION
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No Attachments Needed

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. . . BUT ONLY *STRAIGHT-LINE ACTION*

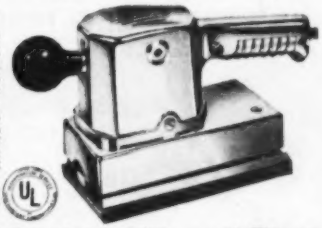
WILL PRODUCE A FLAWLESS, SCRATCH-FREE FINISH

When choosing a power sander —it's the type of action that counts. To do the job right, you must sand with-the-wood grain. Sanding across-the-grain with a circular or orbital motion leaves scratches and swirl marks which show up after varnishing. Always remember—only a Dremel STRAIGHT-LINE ACTION will sand with-the-grain. Take a tip from the professional craftsman, insist on a Dremel—3 popular models to choose from.

Of the four common sanding actions, only Dremel sands 100% *with-the-grain* — the only guaranteed scratch-free action approved by finishing experts.

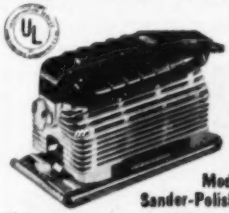
NEW MODEL "53"

This new sander is a real powerhouse, a professional tool at a handyman's price. The first ROTARY MOTOR (AC) sander of its kind to have straight line action. Weighs only 5½ lbs., has 24 sq. in. sanding pad. Out - performs other makes selling for twice as much. Positively the best heavy - duty sander buy on the market. Complete with 2 detachable sanding pads. . . . **$34.85**



EXCLUSIVE! Model "53" has a quick-action detachable sanding pad. Extra pad furnished free.

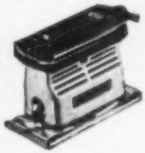
Model "2000" Sander-Polisher



Perfect for small shop, home use. Features Dremel "Straight - Line Action"; high speed reciprocating motor; 14,400 strokes per min.; wt. 5 lb.; 21 sq. in. sanding surface.

Price includes: Sturdy, steel carrying case, Model "2000" Sander-Polisher, 1 polish pad, 25 asst'd abrasives. **$24.50**

Model "A" Sander-Polisher-Massager



Three tools in one! Lighter capacity for general-purpose use. Features "Straight-Line Action"; high speed reciprocating motor; Wt. 2½ lbs.; 12 sq. in. sanding surface. Complete with 1 polish pad, 1 massage pad, 6 abrasives. **$14.85**

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1 x #8
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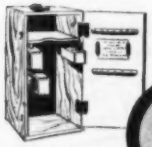

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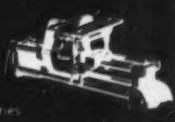

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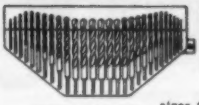

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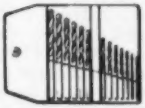

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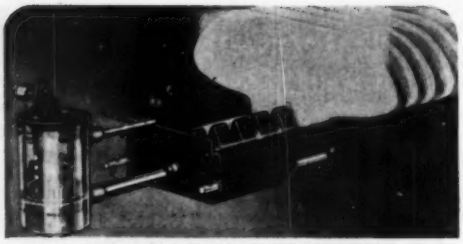

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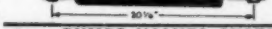

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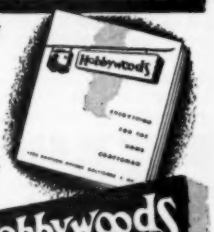

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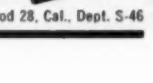

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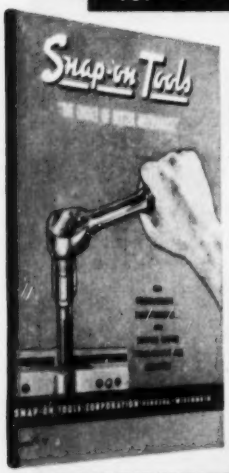

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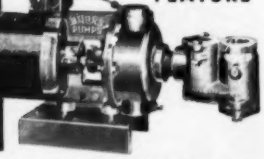

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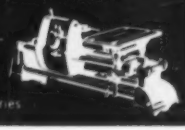

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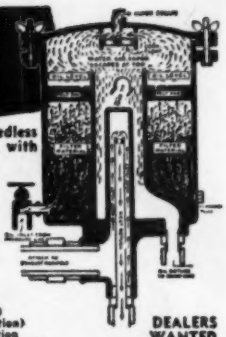

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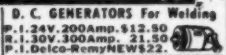

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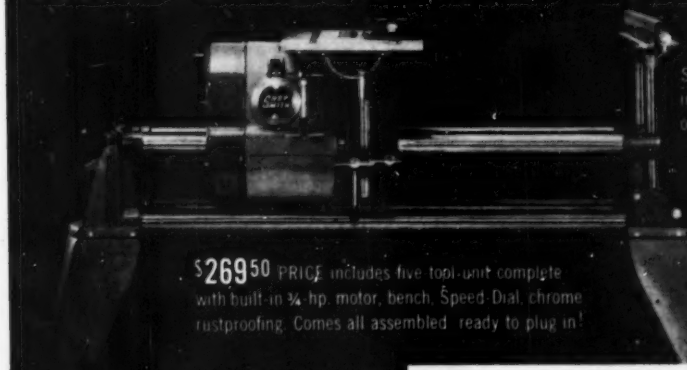

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Same Kit with 8" Combination Blade $24.90

GIL-BILT 12-INCH BAND SAW

- Cuts to center of 24 inch circle
- Handles stock up to 6 inches thick
- 18x18 inch table tilts 45 degrees
- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two ⅝" bore Oilite Bronze bearings
- Upper wheel tension and tilt mechanism of cast aluminum, completely assembled
- Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
- Rigid cast aluminum wheels fully machined ready-to-install. Heavy rubber tires
- Uses standard 78 inch blades up to ⅝ in. wide
- Fully enclosed mechanism for utmost safety

GIL-BILT Metal Parts Kit includes Plans, rubber tires, aluminum wheels, ¼ in. blade, ball bearing spindle, tilt mechanism, blade guides, table tilt segments, and all other metal parts $23.95

Return Kits in 10 days for refund if not satisfied. *For shipments up to 600 miles, add 5%; over 600 add 10%. Amount in excess of actual postage will be refunded.*

Order Kit now, or order Plans at $1.00 each and Kit later less cost of plans. Write for **FREE** Catalog.

ALSO AVAILABLE Plans & Parts Kits for 18-in. Band Saw, Belt Sander, Spindle Shaper, 8-in. Tilt-Table Saw

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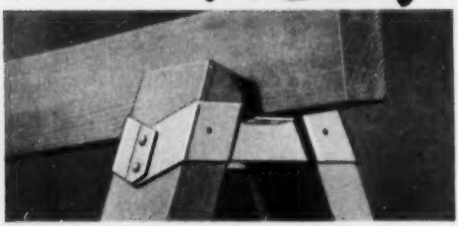

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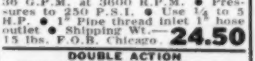
ITEM #31C—31½" bore, 11" stroke. Alloy steel cylinder wall. Micro-Honed and all steel 1⅛" diameter piston rod. 19½" overall length closed. Clevis mounting at base and shaft. Will lift 9625 lbs. with 1000 PSI Pump Pressure. Uses ⅜" tubing fittings. (Fittings to pipe thread: two 3-" MPT @ 35c.) A $102.00



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WITH STRAINER

ITEM #129—Type D-2—May be used as a boat bailing pump, sump pump, barrel pump, fuel transfer pump, for water, oil, gasoline, insecticides, etc. Bronze and aluminum construction. ¾ in. pipe thread ports. Fine general utility hand pump. Capacity—300 Gal. per hr. Ship wt. 6 lbs. F.O.B. Chicago **11.95**

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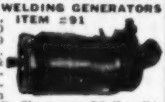
D. C. GENERATOR

IDEAL FOR WELDING GENERATORS

Type R-1, rated 300 Amps. — 30 Volts. Mfd. by Jack & Heints. Government Acquisition Cost $380.00. Shpg. wt. 55 lbs. Dimensions: 16" x 10" x 7". Complete with instructions to connect as Welder. F.O.B. Chicago. **35.00**



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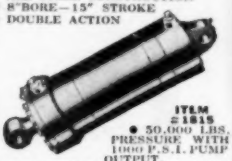
RUGGED!! **25 TON** CAPACITY MASSIVE!!

HYDRAULIC CYLINDER

● ALL STEEL CONSTRUCTION
● 8"BORE—15" STROKE
● DOUBLE ACTION



ITEM #1815 ● 50,000 LBS. PRESSURE WITH 1000 P.S.I. PUMP OUTPUT.

● UP TO 70,000 LBS.—CAPACITY ON INTERMITTENT SERVICE.
● SOLID STEEL 2½" PISTON ROD
● 1" PORTS
● OVERALL DIAMETER—10½"
● DISTANCE BETWEEN CENTERS—28¼" CLOSED—43¼" OPEN.

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with FINGERTIP CONTROL

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USE FOR: ● Reamer Drives ● Midget Cars ● Feed Mills ● Canning Machines ● Conveyors ● Lathes ● Milling Machines ● Motor Boats ● Cream Separators ● Garden Tractors ● Pumps. Variable output speeds from 0 to input speed available by moving control handle. Locking handle maintains setting. Use input power of ¼ to 1½ H.P. Shafts ⅝" diam. Input rotation counter-clockwise facing shaft. Input speed 750 R.P.M. 7½"x7½"x 11½". Gov't acquisition cost $428.00. Shpg. wt. 31 lbs. Complete with 3 qts. of oil and full instructions. F.O.B. Chicago. **54.50**

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ITEM #126—Four-way open center control valve, with built-in adjustable relief valve factory set at 1000 P.S.I. Spring loaded neutral position. For use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Can be used as single unit or mounted in series. Has ⅜" pipe thread inlet and outlet. 1½" pipe thread cylinder ports. Finger grip handle. Ship. wt. 10½ lbs.

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HYDRAULIC PUMP OR MOTOR

NEW MANUFACTURE

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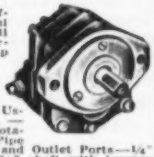

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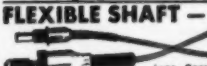

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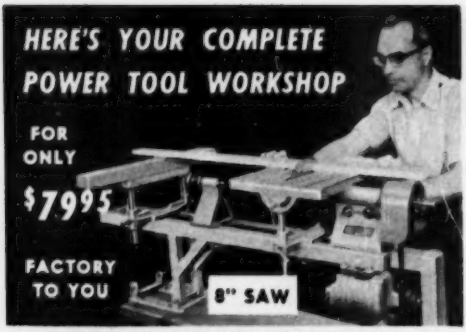

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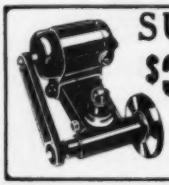

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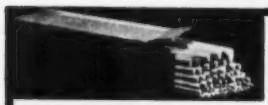

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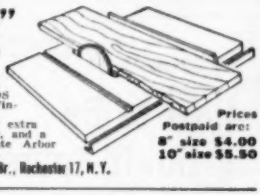

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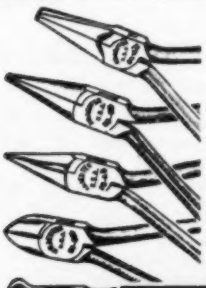

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How Much Did You Learn?

By Stanford E. Taylor and Helen Frackenpohl
Washington Square Reading Center, New York

Now you can sample how much you remember of the useful and interesting information packed into this issue of POPULAR SCIENCE MONTHLY. Answers to the questions are printed just below the quiz. After each answer is a page reference to the article on which the question was based.

1. ***Outboard-motor noise, engineers have found, comes mainly from***
   a. ineffective exhaust muffling
   b. vibration in the boat hull
   c. a poorly designed combustion chamber

2. ***Inventive Americans keep the Patent Office busy with about***
   a. 3,000 applications a year
   b. 35,000 applications a year
   c. 80,000 applications a year

3. ***Sleight-of-hand tricks depend largely on***
   a. speed
   b. misdirection
   c. gadgets

4. ***To TV color expert Rod Davis, colored lighting's main job is***
   a. to build emotional impact
   b. to create depth in stage sets
   c. to ease last-minute color changes

5. ***Turbine engines aren't used in passenger cars as yet because of***
   a. high noise level
   b. high fuel consumption
   c. use of expensive metals

6. ***The trend in Detroit for '55 will probably be toward***
   a. wire wheels
   b. short, easy-to-park bodies
   c. more horsepower

7. ***In selecting components for a hi-fi system, decide first on a***
   a. speaker
   b. amplifier
   c. pickup

8. ***The new automatic gas-range controls work by virtue of***
   a. centrifugal force
   b. the gravity-pin theory
   c. the inclined-plane principle

9. ***The Rhino, a new amphibious vehicle, is remarkable because***
   a. it offers a gentle, easy ride
   b. it can be axle- or jet-propelled
   c. it can move at 55 m.p.h.

10. ***Sports-car cultists may be distressed by the Ford Thunderbird's***
    a. 292 cubic-inch engine
    b. low silhouette
    c. 20-to-1 steering ratio

Answers: 1. b—p. 158; 2. c—p. 136; 3. b—p. 218; 4. a—p. 101; 5. c—p. 112; 6. c—p. 130; 7. a—p. 175; 8. c—p. 168; 9. b—p. 125; 10. c—p. 131.

NEXT MONTH . . .

How to Be A Do-It-Yourself Santa Claus

To help cut the cost of filling Santa's pack, PSM for November will show you how to build four toys that the youngsters are sure to love. All are child-size—for the boys, the lathe that you see here and a companion table saw; for the girls, a miniature range and refrigerator. The tools work, just like big ones. The kitchen appliances will give the girls many happy hours playing house. And that's not all. You'll also find patterns for making novel yuletide decorations for your home.

BUY DIRECT

GIANT 2000-2500 WATT PLANT

110-120 v. 60 cyc. AC absolutely the best made — exclusive dynamically balanced armature; heavy windings develop up to 5000 watt overload for motor starting. Skid mounted — portable. Powered by an easy starting Briggs or Wisconsin 6 HP engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty. (Item 31) Wt. 210 lb. Reg. price $585. Special at..... **$299.50**

Same plant with electric self starter (Item 31a).......... **$359.50**

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GENERATOR ONLY for belt drive.. $239.50

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2" Model (150 gal. per min.) with 2½ HP engine. Item 502a. 90 lbs. Fact. Spec. $184.50

52 pc. SOCKET SET

Highest quality, guaranteed non-breakable sockets made by Husky. Beautifully matched chrome thin wall alloy absolutely the best. Contains a complete set of 28 sockets in ½" drive, ⅜" drive and ¼" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. A beautiful set of tools that will handle any job; in a big doghouse steel box. Wt. 17 lbs. (Item 205) List price $62.90. Factory special.. **$27.95**

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(Item 596) Same unconditionally guaranteed, non-breakable sockets as above. Complete range of 21 sockets from ¼" thru 7/16" (¼" drive) & 7/16" thru 1-1/16" (½" drive). Two extensions, reversible ½" ratchet, 3 drift punches, sliding "T" head, all angle coupling, ½" speeder, ¼" breakover, 5 pc. high chrome alloy combination wrench set and 8 pc. offset wrench set in **big doghouse tool box** with ample room for other tools. Reg. $49.50. Wt. 16 lb.......... **$21.95**

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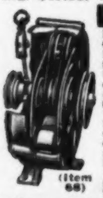

(Item 66)

Heavy duty, made by **B. F. GOODRICH** for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists—any operation requiring variable speed. Employs reliable "trouble free" planetary system. No hydraulic power losses. Infinite range, smooth operation, easy installation. 3 sizes: ½-1 hp. 36 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs.; Reg. list $228, $252 and $352. Our prices . . . . **$79.50**, **$89.50** and **$114.50**

JET STEAM MASTER

Now, a new super-efficient portable steam generator that provides live steam at 100 lbs. pressure in 60 seconds from a cold start! The first quality steam blaster ever offered at this low price. Instantly cleans, sticky grease, dirt, rust, old paint, etc. off motors—farm implements and road machinery. Pays for itself in a few weeks. Sterilizes as it cleans — milk equipment, etc. Fully automatic—oil fired with built-in water circulating pump. Draws water from faucet or bucket. Simple and safe; anyone can use it—built-in safety valve. New triple efficiency jet steam gun automatically mixes in soap or detergent if desired. Wt. 250 lbs. Item 463. Special Factory Price..... **$298.00**

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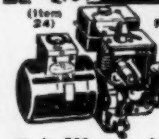
PORTABLE LIGHT PLANTS

Ideal for your camp, cottage, trailer or boat!

600-700 WATTS PUSH BUTTON START



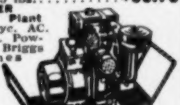
(Item 24)

115 v. 60 cyc. AC Powered by a rugged 2 HP easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24.) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Reg. $275 value..... **$143.50**

1000-1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine with 50% greater output....... **$199.50**

LITTLE GIANT—350 WATT (Item 273) 115 v. DC 1½ hp. Briggs engine. Perfect for lights, radios, chain saws and power tools. Wt. 65 lbs.......... **$99.75**

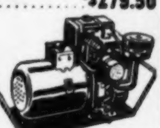
PORTO-POWER 1500-1750 Watt Plant



(Item 20)

115/130 v. 60 cyc. AC. Push button start. Powered by a 4.5 HP Briggs engine. Combines compactness and easy portability with higher output for handling heavier starting loads. Ideal for operating oil burners, sump pumps, freezers, television, lights, communication systems, etc. Perfect for contractor's power tools. (Item 20). Wt. 146 lbs. Factory Special Price.......... **$279.50**

MASTER-LITE 2500 Watt Plant



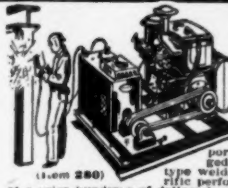
(Item 21)

110/120 v. 60 cyc. AC. A powerful plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 225 lb. Reg. price $645.00 (Item 21) Factory Price....... **$329.50**

3500 Watt Plant Push Button Start (Item 23) 115 v. 60 cyc. AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. $760. Factory Price.......... $379.50

We make fully automatic controls to operate any of the above light plants. Write for details. **We make all sizes up to 25,000 Watts.**

MASTER DC ARC WELDERS



(Item 280)

Now! a portable, rugged, industrial type welder with terrific performance, yet at a price hundreds of dollars less than you'd expect. Senior model made for years of trouble-free, continuous service. High capacity DC welding unit enables you to tackle any job with confidence—easily welds anything up to 2" plate using from 1/16" to ¼" rods. Built-in stabilizer and cooling system makes arc easy to strike and hold. Dual control rheostat provides low heat soldering, brazing and welding from 30 to 300 amps. Complete with instructions, guarantee and **triple** V-belt or flat pulley. You can pay more, but you can't buy a better welder.

WELDER ONLY — DUAL CONTROL MODEL. Same as above, but drive with your tractor, jeep or gas engine of 14 HP or more. (Item 38a.) Wt. 110 lbs. $450 value.......... **$119.50**

WELDER ONLY—STANDARD MODEL. Same as above but with single rheostat for heavy metal welding only. (Item 38.) Wt. 110 lbs. $400 value. Special.. **$99.75**

COMPLETE POWER MASTER (Illustrated above) powered by a 14 hp., air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Compares with welder costing $1200. Special for October only....... **$399.50**

WELDING KIT, Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder...... **$10.50**

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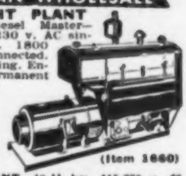
DIESEL LIGHT PLANT



(Item 1660)

(Item 1660) Diesel Master—11-12 kw. 115/230 v. AC single or 3 phase. 1800 rpm direct connected. Electric Self-starting. Engineered for permanent power where continuous low-cost, heavy duty service is important. Wt. 1350 lb. Reg. list $3650.00. Factory price... **$1895.00**

GAS DRIVEN PLANT. 10-11 kw. 115-230 v. 60 cyc. AC, single or 3 phase, powered by 4 cylinder Wisconsin air cooled engine. Belt driven. Simple, reliable. 5 V-belt drive mounted on rugged steel skid. (Item 217) (with crank start) Wt. 900 lb. Factory price.......... **$1075.00**

Same plant with self-starter...... $1145.00

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(Item 10) easily installed in furnace pipes. Forces even heat to all rooms. Over range removes kitchen smoke and odors. Powerful, continuous duty motor, 110-120v. AC. Mount in wall or ceiling to ventilate any area. Quiet, super-efficient fan moves huge volume of air. (400 to 600 CFM).

8" Fan, wt. 5 lb. $6.88
9" Fan, wt. 6 lb. $7.88
10" Fan, wt. 7 lb. $8.88
12" Fan, wt. 8 lb. $9.88

HEAVY DUTY FAN. Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. (Item 10E)................ $11.95
12" Fan, wt. 10 lbs. (Item 10D).... $12.95

EXTENSION CORD

Very flexible and tough; Neoprene #16-2 conductor cord, ideal for lawn mowers, hedge trimmers and power tools. U.L. approved. Complete with heavy rubber plug and outlet. 40 ft. cord (Item 17a) Wt. 2½ lbs. regularly $4.95—SPECIAL.. **$2.95**

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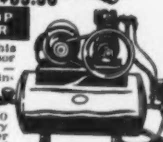
NEOPRENE CABLE #14-2 (Item 185) Heavy duty, very flexible, 20 year quality. Wt. 9 lbs. 100 ft. Complete with rubber plug and outlet. *A terrific buy at only*...... **$8.95**

NO. 12-2 POWER CABLE. Very flexible rubber covered, special outside shield for grounding power tools, etc. 50 ft. (Item 199) wt. 8 lbs. $6.95. 100 ft. (Item 200)........ $12.95

9 TON HYDRAULIC PRESS

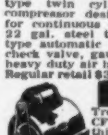
A tremendously powerful hydraulic press, capable of exerting 18,000 lbs. pressure. Pays for itself many times over—straightening bent connecting rods, king pins, crankshafts, axles, link pins and bars — or pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvils and jigs to straighten any kind of curve or bend. (Item 464) Wt. 110 lb. Actual list price $365. Our special close-out price.... **$69.50**

MASTER SHOP COMPRESSOR



Big and rugged. This stationary compressor provides 8 c.f.m. — plenty of air for industrial uses, powered by heavy duty repulsion induction ¾ HP, 115/230 v. motor. Factory type twin cylinder compressor designed for continuous operation. Mounted on heavy 22 gal. steel tank. Complete with unloader type automatic switch, pressure relief valve, check valve, gauge, shut-off valve, and 20 ft. heavy duty air hose. (Item 209h) Regular retail $319.50. Factory price **$174.50**

JET FLOW BLOWER



Tremendous air movement (1800 CFM) and quiet operation make this double inlet 10" turbine blower unbeatable for heating, cooling, drying and air conditioning. Ideal for attic or barn ventilation, converting gravity heating to forced air; spray booth exhausts, etc. Operates with any ¼, ⅓ or ½ HP motor. Oversized, long life bearings. Includes variable speed motor pulley and belt. Dimensions 19" hi x 8" x 16½". Outlet opening 13" x 11⅝". Wt. 45 lbs. Item 245. Reg. $54.50. Factory Special................ **$27.50**

HEAVY DUTY ¼ HP *motor for above* $16.95

12" TURBINE BLOWER Similar to above, but larger with 2400 CFM capacity. Wt. 65 lbs. (Item 245a) Reg. $70.00. Factory Spec. $34.50

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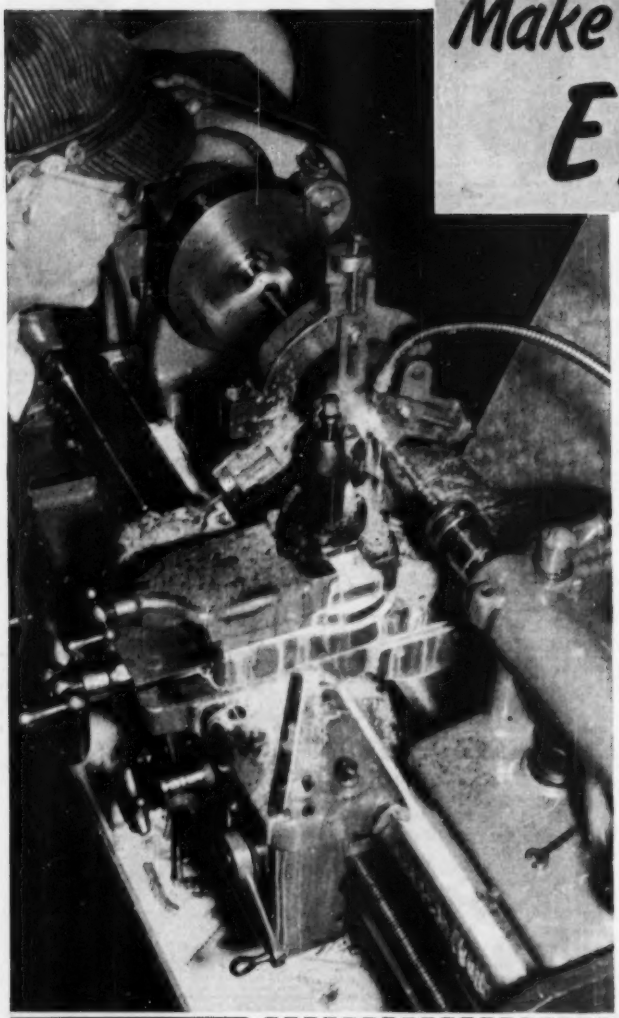

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SWING: 14⅝" over bed and saddle wings; 10¼" over saddle with chip guard removed.

BED LENGTHS: 5, 6, 7 and 8 feet.

DISTANCE BETWEEN CENTERS: 24⅛ to 60⅛ inches.

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Without obligating you in any way, I'll send an Actual Lesson to prove that training at home is practical. I'll send my 64-page book to show good job opportunities for you in Radio-Television, show equipment you build, show what my graduates are doing and earning. Terms for NRI training are as low as $5 a month. Many graduates make more in two weeks than the total cost of my training. Mail coupon now. J. E. SMITH, President, National Radio Institute. Dept. 4KB. Washington 9, D. C. OUR 40TH YEAR.

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Be a Success as a RADIO-TELEVISION Technician

See Inside

NRI Training Can Lead to Jobs Like These in Radio-Television

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